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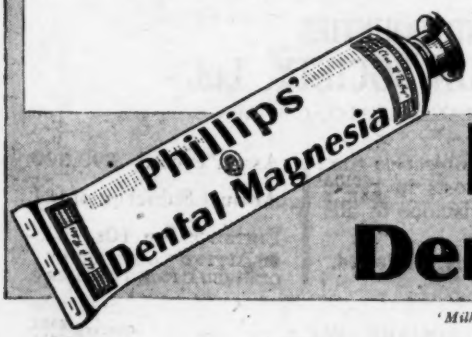

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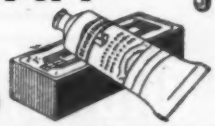

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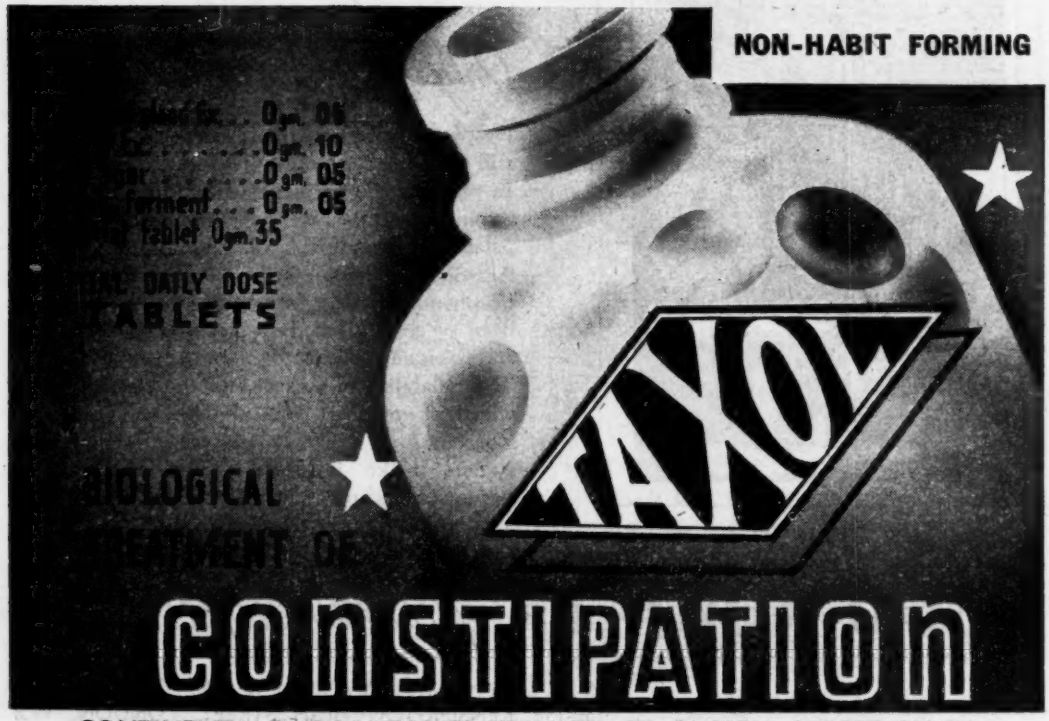

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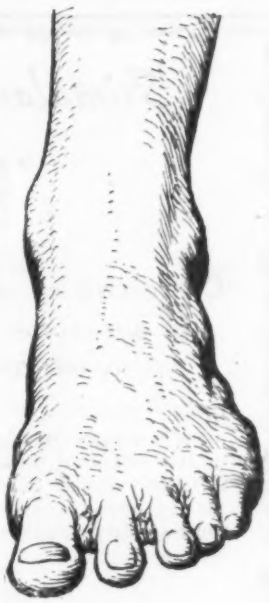

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[1] *British Medical Journal*, 1935, November 16th, p. 938.
[2] *British Medical Journal*, 1938, January 15th, p. 105.

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BACTERIOLOGY OF WAR WOUNDS

R. J. V. PULVERTAFT, M D CAMB, F R C P
MAJOR RAMC;
DADP AND OC CENTRAL PATHOLOGICAL LABORATORY, M E F

DURING the past two years a routine investigation has been made of the bacteriology of battle casualties at three base hospitals in the MEF. Earlier tests were made by a technique which was not standardised. During the campaign of El Alamein, 192 wounds were examined by a standardised technique, and the results are here given. The hospital was the —th Scottish General; it had approximately 900 beds, and there were attached a neurosurgical and orthopædic unit. Thoracic and abdominal cases were not admitted as a rule. Experience elsewhere, however, suggests that the results may be taken as representative.

TECHNIQUE AND FINDINGS

There is no standard technique of wound culture. This is undoubtedly responsible for very wide variations in individual findings. Technique must be standardised at every point. The majority of these cases were examined by forwarding a "dip swab" culture, taken by the surgeon, to the laboratory. Experiments showed that when these were cultured directly on to media, an entirely different qualitative and quantitative result was obtained from that found when the swab was soaked for five minutes in broth, and then cultured. This is probably particularly true in a hot dry climate. It was further observed that when cultures were taken at the bedside by a bacteriologist with a platinum loop on to a medium, hæmolytic streptococci were nearly always found; whereas the average incidence in the "swab cultures" was only 30%. Again, by means of a glass tube plugged at the end with gelatin, cultures were taken from the depths of wounds, and found to show quantitative, but not qualitative, differences from superficial pus. In general, pus on a dressing shows vastly more organisms than pus in a wound, particularly when gram-negative bacilli are present. As a final example, in this examination neither inspissated serum nor tellurite media were used. Only one or two corynebacteria are noted. But, in a former investigation at a general hospital, two years before, when corynebacteria were specifically sought, they were found with great frequency by direct culture on to tellurite plates. In this campaign, many corynebacteria were sent to the Central Pathological Laboratory for virulence testing, as wound or sore isolations. Out of 75 tested, 57 proved virulent.

It is emphasised, therefore, that this investigation was not a complete one.

The technique was as follows:

(*a*) Swabs were taken by the surgeon.
(*b*) They were moistened before culture.
(*c*) They were inoculated on to alcohol-dried blood-agar plates; drying is essential, since proteus and pyocyaneus are common.
(*d*) Cultures were also made into anaerobic media.
(*e*) The anaerobic culture was subcultured aerobically on to alcohol-dried blood-agar.

The results of these examinations are given in the table. They are divided into results on head cases, and wounds in other parts of the body. The differences in incidence of staphylococcal infection may be significant.

WOUNDS OTHER THAN HEAD WOUNDS (52 CASES)		HEAD CASES (140)	
Infecting organism	*Cases and %*	*Infecting organism*	*Cases and %*
Hæm. strep.	19 (36)	Hæm. strep. ..	35 (25)
Non-hæm. strep. ..	5 (9·6)	Non-hæm. strep. ..	26 18·5
Hæm. *Staph. aureus* ..	13 (25)	Hæm. *Staph. aureus*	43 (30·7)
Non-hæm *Staph. aureus*	15 (29)	Non-hæm. *Staph. aureus*	60 (42·8)
Proteus	3 (5·7)	Proteus	14 (10)
Pyocyaneus	6 (11·5)	Pyocyaneus	10 (7·1)
Coliform bacillus ..	10 (19)	Coliform bacillus ..	35 (25)
Staph. albus	7 (13·5)	*Staph. albus* ..	53 (38)
Morph. clostridia ..	10 (19)	Morph. clostridia ..	25 (17·8)
C. welchii	2 (3·8)	*C. welchii*	5 (3·5)
Strep. viridans ..	1 (2)		
Diphtheroids	1 (2)		

Hæm. strep. = Hæmolytic streptococcus; Staph. = Staphylococcus; Morph. = morphological.

These cases were all battle casualties, and it is the practice in the MEF to administer sulphonamide prophylactically in all such cases. The advice of the neurosurgical specialists is to administer 25 grammes of sulphanilamide orally in the first 48 hours, and the powdered drug locally. Other surgeons advise about half this dosage. In nearly all cases the drug is administered, and (so far as can be made out) both locally and orally.

In 57 cases repeated examinations of the same case were made. Analysis of results shows that multiple infection of wounds is common, and that on re-examination new organisms appear and old ones disappear. The appearance of new organisms is usually interpreted as indicating hospital infection. It is difficult to discard contemporary work which supports this view. Two other factors, however, undoubtedly contribute to this finding: firstly, the fact that a strictly standardised technique is rarely if ever followed; and secondly that organisms seem to be latent in a wound, and to appear when a change in the treatment is made.

For example, detergent cationic bactericidal agents have been advocated in wound therapy, and one of these, 'Zephirol,' is much used by the Germans. Another, known as 'CTAB'—cetyl-trimethyl ammonium bromide—an exceedingly toxic and actively hæmolytic reagent, has recently been recommended, and a third, cetyl pyridinium bromide, which was kindly provided by the National Institute for Medical Research, was investigated in the course of this work. It is a most active bactericidal agent, and bacteriostatic in concentrations of 1 in 10 million against gram-positive organisms. In a series of scalp-wound infections, it was found to be worse than useless. The wounds in question had been previously dressed with sulphathiazole powder, and a 1 in 1000 solution of this drug was used instead. Where staphylococci in small numbers had previously alone been found, hæmolytic streptococci then appeared, in addition to greatly increased numbers of staphylococci. In this series dressings were carried out in the theatre, with all possible precautions. It is far more likely that the streptococci were previously present, and were kept in control by the sulphathiazole, than that they were immediately introduced on dressing.

Again, in cases treated with penicillin, succinyl sulphathiazole (sulphasuxidine), and tyrothricin, the disappearance of gram-positive organisms was nearly always associated with the appearance of pyocyaneus or proteus.

In the treatment of urinary infections with mandelic acid, a change in the infecting organism has often been noted.

Finally, patients treated with oral succinyl sulphathiazole are found to lose almost all their gram-negative fæcal flora, but the fæces then contain vast numbers of enterococci.

In deep lacerated wounds it is almost impossible to state with certainty that the organisms identified at any one time are all that are present, and the study of wounds over a two-year period suggests that the conditions obtaining in early and late wounds are in themselves sufficiently different to favour the growth in them of different organisms.

SEPSIS AS A CAUSE OF DEATH

Having established the fact that wound infection, under the favourable conditions of the El Alamein campaign, is common and various, it may be of value to ascertain how far it is responsible for death in base hospitals.

For this purpose an analysis was made by Capt. A. D. Morgan, RAMC, pathologist in the Central Pathological Laboratory, of the causes of death at the —th Scottish General Hospital during 1941–42. The autopsies were almost all performed by him, and very fully investigated and recorded. The results are of considerable general interest.

The total number of battle casualties admitted was 2472, and the number of deaths 74 (about 3%). Of these 74 cases, 52 were wounds of skull or spine. The mortality therefore from all causes in wounds other than these was very low; and the number of cases in that class dying directly of wound sepsis, so far as can be ascer-

tained, was only 5. Sepsis nevertheless is an important cause of death in the head and spine cases.

Since an orthopædic unit was attached to this hospital, it follows that a high percentage of serious compound fractures were admitted, and of course most of them were muscle wounds. No patient died from gas gangrene or tetanus; in 1939, 5 cases of gas gangrene had died.

THIS WAR AND THE LAST

The position therefore is that wound sepsis is common, but causes an insignificant death-rate outside brain, spine, chest and abdomen. This is very satisfactory, and is well recognised. The tendency sometimes is to attribute the success to sulphonamide prophylaxis and closed-plaster technique; and to suppose that a great advance has been made compared with 1918 in France. But the latter supposition receives no support from the official history.[1] In 1918, too, wound infection was rife; 10% of cases showed hæmolytic streptococci on admission, and 90% a week later—a whip often used to smite the un-Listerian dressers at base hospitals, probably quite unjustly. All wounds, it is stated, might be considered contaminated or infected. Yet the mortality-rate in 10,000 cases from all causes is given as 0·5%; and as some of this was due to gas gangrene, whose fatality-rate was 25%, there is not much left over for wound sepsis. The conditions earlier on were, undoubtedly, very different. But at the end of the war, without sulphonamides, and without closed plaster, the septic wound was not a danger to life.

It was with some surprise that I found these figures for the last war and compared them with the present series. The impression appears to be fairly general that sulphonamides, closed plaster, and the emergence or adolescence of orthopædic surgery since the last war has revolutionised infection in wounds. True, the incidence of hæmolytic streptococci in wounds taken early and late is well below the 90% level of the last war; but it has already been said that the present percentage could be made to appear higher by a more fervent search for the organisms. Even in this series of "swab cultures," it became much higher than in previous personal cultures, after they were looked for in anaerobic culture. Sepsis is all but universal, and few die of it now; the condition was apparently identical in 1918.

How much does infection matter? How long did it endure in the last war? How long does it endure now? How is it treated now? How was it treated then?

An impression has been gained that in a proportion of cases, but most certainly not in all, the doctrines of sulphonamide prophylaxis and closed plaster have closed the mind to the problem of established sepsis. Sulphonamides are given as soon as possible after wounding. Oral doses are continued for a varying period; but, sooner or later, when pus forms in a wound, they are abandoned. This appears to me to be wise. There seems to be no evidence that oral sulphonamides will control sepsis in established suppurations. They all, in varying degrees, produce nausea, loss of appetite, cyanosis, hæmaturia and anuria, skin rashes, and agranulocytosis. The special problems of neurosurgery must be here omitted.

Local wound therapy is variously attempted; certain orthopædic and neurosurgeons prosecute it vigorously, while other individuals consider it useless. It is fair to say that it is usually not possible, because of the closed-plaster technique; and the bogy of "hospital infection" tends to discourage it. The surgeon, it is thought, is the enemy of the wound. An apple a day keeps the surgeon away; plaster does it more effectively. And as for pus, the modern surgeon's attitude towards it is much the same as the modern theologian's attitude towards sin; it is not quite as bad as it used to be.

Reference to the official history shows that in the last war wound sepsis was vigorously and variously attacked by local means. It is not necessary here to recall that Carrel-Dakin treatment, acriflavine, BIPP and hypertonic saline were, one or other of them, always employed.

It would be easy to make false inferences from the figures given here. The important fact is not what organisms are in a wound, but how the wound behaves. It is important to know how long the patient is, and was, invalided; and what the result is and was. No direct comparison of that kind can be drawn from the information here given.

However, it is a fact today that a fair proportion of wounds with gross tissue damage suppurate profusely for a very long time, and this is particularly true of compound comminuted fractures. Such suppuration may continue month after month. The picture presented by such a patient is distressing. He is emaciated, listless, devoid of appetite. He develops plaster pressure sores and bed-sores with no tendency to heal. His temperature swings from 103° to 98° F. month after month. The volume of pus daily exuded may attain levels of over 100 c.cm. The smell is most offensive; the plaster, dressings and bed are soaked in pus. Albuminuria with casts is common, and almost always he shows a profound anæmia with red-cell counts of 2·5 million, and 50% hæmoglobin.

The anæmia is only poorly responsive to transfusion; he rapidly again becomes anæmic. This anæmia with high colour-index is characteristic of prolonged sepsis in the Middle East Forces, and is entirely intractable. He has little pain, but a great deal of misery and discomfort. He rarely dies; and if he does, there is little to explain death in many cases; he just wastes away.

What will be the future of such a patient? How much chronic osteomyelitis will be found hereafter? How many cases of nephritis? How far will such a patient ever be restored to normal health?

CONCLUSIONS

1. A standard technique for the bacteriological examination of war wounds is desirable.

2. As in the last war, all war wounds must be considered to be contaminated or infected.

3. The commonest infections are staphylococcal. Streptococcal infection is widespread. Clostridia are often present, but clinical gas gangrene is rare. Gram-negative organisms are common, particularly in old wounds. Clinical tetanus is not found; the bacillus is often present.

4. Sulphonamide prophylaxis, local and general, is widely used, but has not prevented wound infection.

5. Infection of wounds is still the gravest problem in treatment. It is a prime cause of death in wounds of head, spine, thorax and abdomen.

6. Wounds in other parts of the body, though infected, do not often cause death from infection. Since this was also the case in 1918, there is no evidence that the position has improved. There is a general impression that sepsis is less severe and of shorter duration. But many cases, in a degree and in numbers directly proportional to the degree of tissue damage, suppurate profusely and for long periods with grave effects on the patient.

7. There seem therefore to be strong reasons for the employment in selected cases of more vigorous methods of wound treatment than those usually pursued in the laissez-faire atmosphere of closed-plaster technique.

1. Official Medical History of the War, Surgery, London, 1922, vol. i, p. 229.

TUBERCULOSIS IN CHILDREN*

STUDY OF 100 CASES

JOHN C. ROBERTS, M D LOND, M R C P
ASSISTANT MEDICAL OFFICER TO THE COUNTY SANATORIUM, HAREFIELD, MIDDLESEX

THIS analysis of 100 consecutive cases at Harefield Sanatorium illustrates some of the clinical features and sequelæ of tuberculosis in infants and children.

Of these 100 children, 50 were found to have a primary complex in the lung (table I). In only 2 was the pulmonary component not evident radiologically. Parrot [1] in 1876 was the first to consider that the lesion in the lung was the primary focus and the regional glandular involvement the result. This combination of a peripheral focus with enlargement of the associated glands was called by Ranke [2] the primary complex (fig. 1). Many people minimise the importance of these primary infections and some even consider treatment unnecessary.

* Based on an address given to the Tuberculosis Officers Association of the Middlesex County.

1. Parrot, J. *C.R. Soc. Biol. Paris*, 1876, **18**, 308.
2. Ranke, K. E. Ausgewählte Schriften zur Tuberkulosepathologie, Berlin, 1928.

In this series the primary lung lesions were distributed as follows: right lung 28 (upper zone 7, mid-zone 6, lower zone 12, two zones combined 3); left lung 19 (upper zone 8, mid-zone 3, lower zone 7, two zones combined 1); both lungs 1; glands only 2. Examination of contacts shows that many children become infected by the tubercle bacillus; this is shown by the development of a positive tuberculin reaction without apparent illness or demonstrable radiological lesions, though a calcified focus may later be found in the lung or root glands. This outcome may be due to a high degree of resistance or variation in dose or virulence of infection; others—such as those reported here—show constitutional disturbance. Of the 50 children with a primary complex 35 (70%) had symptoms, the commonest being cough, fever, malaise, lassitude, loss of weight and gastro-intestinal upsets; in 5 cases erythema nodosum was noted, and in 2 each asthma, pain and phlyctenular conjunctivitis were present (table II). It seems reasonable to suppose that the children with demonstrable lesions or definite symptoms have an increased susceptibility or have received a more virulent or larger dose. In any case these children need careful and often long treatment. In some, perifocal infiltrations are well marked (fig. 2). In others, an element of pulmonary collapse due to bronchial obstruction by the enlarged glands ("epituberculosis") may complicate the picture (fig. 5). Perifocal infiltrations may not be as benign as has been generally thought and may cavitate (fig. 3) with corresponding increase in constitutional disturbance and liability to bronchogenic dissemination—a catastrophe sometimes averted by prompt recognition and treatment.

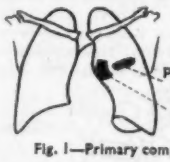


Fig. 1—Primary complex.

2 3 4

Fig. 2—Perifocal infiltration. Fig. 3—Same case: cavitation.
Fig. 4—Same case after pneumothorax and phrenic crush; atelectasis, lower lobe; cavity not now seen.

5 6 7

Fig. 5—Area of pulmonary collapse with displacement of mediastinum to the right. Fig. 6—Same case: spread of lesion, collapse less definite.
Fig. 7—Same case: shrinkage of lesion after lipiodol.

TABLE I—FINDINGS IN 100 TUBERCULOUS CHILDREN ADMITTED TO SANATORIUM

Lesion	Total cases	Boys	Av. age	Gastric lavage positive		Contacts discovered	Symptoms present
				Total cases	Boys		
			(yr.)				
Primary	50	24	5·7	15 (30)	6	41 (82)	35 (70)
Disseminated ..	18	11	6	7 (39)	3	8 (44)	16 (88)
Pleural effusion ..	14	9	9	2 (14)	1	5 (36)	14 (100)
Adult type ..	8	0	12·4	6 (75)	0	5 (62)	6 (75)
Cervical adenitis	7	3	6·2	2 (28)	1	1 (14)	7 (100)
Peritonitis ..	3	1	10·6	1 (33)	1	0	3 (100)

The figures in parentheses are percentages.

TABLE II—SYMPTOMS CAUSING SPONTANEOUS COMPLAINTS

Symptom	Cases	Lesion					
		Primary	Disseminated	Pleural effusion	Adult type	Cervical adenitis	Peritonitis
Cough	29	13	3	7	5	0	1
Fever	17	8	3	6	0	0	0
Malaise, lassitude ..	16	7	2	2	2	0	3
Loss of weight ..	7	4	1	1	1	0	0
Gastro-intestinal ..	14	6	3	2	0	0	3
Erythema nodosum	7	5	1	1	0	0	0
Asthma	2	2	0	0	0	0	0
Pain	8	2	0	4	2	0	0
Large glands ..	10	0	3	0	0	7	0
Bone or joint affected	4	0	3	0	1	0	0
Phlyctenular conjunctivitis ..	3	2	0	1	0	0	0
Sinuses	2	0	1	0	0	1	0

The parenchymal lesion may spread (fig. 6). Indeed some cases show considerable fluctuation before resolving. The enlarged glands may obstruct a bronchus and if obstruction is incomplete pressure emphysema may develop (fig. 8), causing severe dyspnœa with the clinical picture of acute asthma. Complete obstruction produces atelectasis (fig. 9) and the symptoms are relieved.

8 9 10

Fig. 8—Partial obstruction of right lower lobe, with pressure emphysema causing depression of the inner part of the diaphragm on the right.
Fig. 9—Same case: development of atelectasis.
Fig. 10—Same case: bronchogram showing crowding of bronchi in right lower lobe.

Mixtures of the two processes—parenchymal spread with bronchial obstruction—may be found. We have bronchoscoped some cases and demonstrated the obstruction, sometimes noting œdema of the mucosa and sometimes distortion from glandular pressure; occasionally a gland may be seen ulcerating through the bronchial wall. Toxæmia may decrease when drainage of the affected lung is improved. This was seen in one case when, after an injection of iodised oil into the bronchi, the gastric lavage which for many months had been negative became positive, toxæmia diminished and radiologically the lung lesion became smaller (fig. 7). Permanent atelectasis may sometimes result (fig. 11) and the bronchus may become stenosed. Iodised oil injection into these atelectatic areas has shown in some cases crowding of the bronchi but no bronchial dilatation (fig. 10), though this may also be present in some cases (fig. 12). These observations may throw some light on the subsequent development of bronchiectasis, and symptoms may be produced by inflammation around the dilated bronchi or the retention of secretions in them. Childhood infection may thus produce symptoms and disability at the time

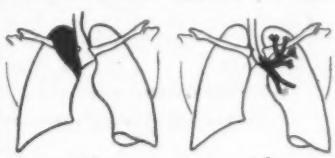

11 12

Fig. 11—Permanent atelectasis of right upper lobe due to stenosis of bronchus.
Fig. 12—Bronchogram showing bronchiectasis of left upper lobe.

or in later life. Gastric lavage was positive in 30% of the patients with primary lesions; symptoms—by which is meant only spontaneous complaints either by the child or parent—were present in 70%, quite a high figure.

DISSEMINATED LESIONS

Dissemination of bacilli is probably common and the factors determining the presence or absence of demonstrable lesions are often difficult to understand. Acute miliary dissemination with severe toxæmia and fairly rapid termination in meningitis is familiar to all. A similar picture with a longer course and occasional recovery is also seen.

One fatal case showed remarkable clinical and pathological features. The illness was long and the presenting symptoms were abdominal; the general condition remained good considering the long-continued fever and at one stage recovery seemed probable until further dissemination involved the meninges. At autopsy, disseminated foci were found in the lungs in various stages, some fibrosed, some calcified and some recent. A partly calcified and partly caseous primary complex was observed in the lung. Old calcified and recent lesions were found in the spleen and liver; there was also involvement of the spine.

Another such case is still alive after 3 years of illness, and the picture in the lungs showed miliary lesions (fig. 13) which subsequently cleared considerably (fig. 14). There are calcified foci in the abdomen and there are also lesions in an elbow, a knee, and a hip. This case presented difficulties in diagnosis, and unexplained pyrexia, infectious enteritis and tuberculous peritonitis were in turn diagnosed at different stages.

In these 2 cases there was no known contact.

More isolated disseminations may be seen, some single and some multiple. Thus a joint or a bony lesion may first attract attention. In the case of synovial tubercle, in my experience, the lesion may be relatively painless for a long time. In one child swelling of a knee was first observed by a nurse while she was washing the child. No complaint of pain was made either at rest or on movement of the knee. It is noteworthy that the secondary focus may progress while the primary lesion is healing. Fortunately both primary and secondary lesions may heal. Multiple dactylitis is present in one case and there are 3 children with spinal caries. These lesions need long treatment, possibly lasting years, and fluctuation in the course of the illness is to be expected.

Pleural effusion.—In all cases of effusion symptoms were present, such as pain, fever, dyspnœa and variable constitutional upset. The effusion may arise early in the disease and may be the result of a focus directly under the pleura. Allergy may play a part. One of our cases with a primary lung lesion developed an effusion after being in hospital some months. In another an effusion which had almost resolved formed afresh, being preceded by pain in the chest and constitutional disturbance. Absorption may be slow and many months may elapse before it is complete. No lesion may then be seen in the underlying lung or a primary complex may be present (figs. 15 and 16). Diagnostic puncture only has been carried out, except in one case where the effusion was aspirated on account of respiratory distress. The prognosis in this group appears good. A caseous focus may rupture into the pleura and a bacillary effusion form. These have a more serious prognosis and may become secondarily infected. In one child a secondarily infected pleural effusion was complicated by a spontaneous pneumothorax (fig. 17). In all cases, in my opinion, air replacement is contra-indicated.

Peritonitis.—Abdominal lesions have been few; they may vary from ulceration of the intestine—indicated by diarrhœa and bacilli in the stools—to tuberculosis of the lymphatic glands and ascitic tuberculosis. Symptoms vary accordingly; some may simulate appendicitis and the diagnosis be made at operation. There are only 3 cases in this series and recovery was well on the way before admission so I will only remark that the incidence due to bovine bacilli should decrease with efficient pasteurisation of milk, but human bacilli should not be forgotten as a cause.

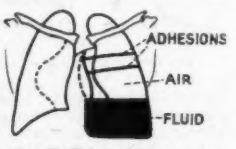
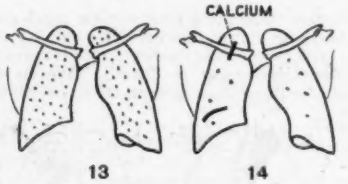


Fig. 17—Tuberculous pyopneumothorax.

Cervical glands.—These cases present as a rule with swelling in the neck, often painless or comparatively so, accompanied by variable degrees of ill health. Abscess formation is common, and scrofulous lesions may result from ulceration. The glands affected depend on the portal of entry of the bacilli (I am not speaking of cases where the glands may be affected by hæmatogenous spread from other parts of the body.), though spread down the lymphatic chain may make the site of entry difficult to determine. When the tonsillar glands are affected we sometimes select a propitious time and remove the tonsils. In one case the glands then subsided. Tonsils and adenoids are sectioned for histological evidence of tuberculosis. In our few cases no lesions were found but they are recorded in varying incidence by others. Operation is not without risk and should only be undertaken in selected cases. In one case the mediastinal glands enlarged after operation and subsequently subsided.

Adult-type lesions.—In the 8 cases girls preponderated; 6 were known contact cases. The clinical features are similar to those found in adults. Collapse methods—unilateral and bilateral, pneumothorax, phrenic crush and extrapleural pneumothorax—have been used where indicated, and the results so far are encouraging. Some of the cases on admission had extensive disease (figs. 18 and 19). The relation between them and their primary infection merits serious study; one primary case with cavitation, had it not been treated, might have appeared in this group (figs. 3 and 4).

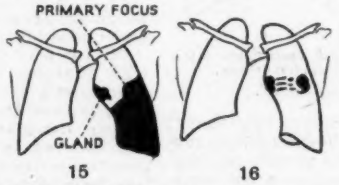
Gastric lavage is a useful diagnostic adjunct but not, in my opinion, an essential one; it has not been related to the clinical severity of the cases in this series. I use it as one of the criteria for deciding discharge home, negative lavage over some months being desirable. In some of our cases it has taken a long time—more than a year—for the lavage to become negative. Sedimentation-rates are done on these children and have proved of especial value in following the activity of the primary lesions.



13 14

Fig. 13—Chronic miliary lesions.

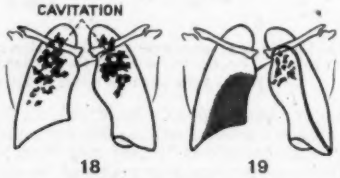
Fig. 14—Same case, a year later; clearing lesions.



15 16

Fig. 15—Pleural effusion with primary lung focus at its upper level.

Fig. 16—Same case after absorption of fluid, showing primary complex in left lung.



18 19

Fig. 18—Adult type of disease.

Fig. 19—Same case after bilateral artificial pneumothorax.

SUMMARY

A series of 100 consecutive cases of tuberculosis in children is described; 50 of them had demonstrable primary pulmonary lesions only.

From the data it seems that supervision and treatment in an institution is desirable for children with primary pulmonary lesions; hospital treatment is of course necessary for those with other tuberculous lesions.

I am obliged to Dr. H. M. C. Macaulay, medical officer of health for Middlesex, for permission to publish this paper, to Dr. K. R. Stokes and Dr. L. E. Houghton for criticism, to Dr. E. Nassau for the pathological examinations, Mr. T. Holmes Sellors, FRCS, for the bronchoscopies, Dr. L. Blair for radiography, and the ward staff for their coöperation.

LISTERIA MONOCYTOGENES* ISOLATED FROM A CASE OF INFECTIOUS MONONUCLEOSIS

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THE case of glandular fever here reported had a typical history with swollen lymphatic glands, pharyngitis, fever of 3 weeks' duration and a mononucleosis. The enlarged glands did not fully subside nor the blood-picture return to normal until the 5th week. At no period were there signs of involvement of the meninges or brain.

CASE-RECORD

A Cambridge medical student, aged 20, noticed on waking that the glands in the posterior triangle of the neck were swollen and firm, but not particularly tender. The same evening he had an attack of shivering with muscular pains, frontal headache and general malaise. Next day he went to his home in the country, 15 miles distant, and was put to bed. His evening temperature rose to 102·6° F. He gradually improved and on the 11th day was afebrile and got up. There was a prompt recrudescence of all symptoms, including the lymphadenitis, the inguinal group now becoming involved in addition to the cervical. His throat became sore and swallowing was very painful. His temperature rose again, to 102° F. No rash was observed. On the 14th day of the disease, when the recurrence was at its height, a sample of vein blood was taken. The acute pharyngitis persisted for a week and his subsequent clinical history was the usual one of slow convalescence with residual lassitude and weakness. He was febrile for 3 weeks and in bed for a month. At the 5th week his glandular enlargement had subsided but traces of lethargy and difficulty in prolonged concentration on his studies were present for another two or three months.

Blood-picture.—The white-cell counts are shown in table I. The picture on the 14th day was typical of infectious mononucleosis. The lymphocytes and monocytes together comprised 87% of the total white cells. The characters of many

TABLE I—PATIENT'S LEUCOCYTE COUNTS

Day of disease	14th		23rd		38th	
Total white cells per c.mm.	17,800		8000		7300	
	%	abs.	%	abs.	%	abs.
Polymorph. neut.	12·5	2225	10·0	800	15·5	1130
,, eosinoph.	0	0	0	0	1·0	75
,, basoph.	0·5	90	2·5	200	0·5	40
Lymph. (small, int., large)	35·0	7475	35·0	2800	74·0	5400
Lympho.-mono. (abnorm. gr.) ..	42·0	6230	40·0	3200	5·0	365
Monocytes	10·0	1780	12·5	1000	4·0	290

of these mononuclear cells were those commonly found in glandular fever, the distinction between the large lymphocyte and the monocyte being difficult. The cells of this indeterminate group had a round, oval or slightly indented nucleus and an abundant bluish cytoplasm, the colour in a small percentage being very deeply basophilic. The fine reddish granulation often noted in glandular fever mononuclears was not seen. The polymorphs showed a slight depression below the lower limit of normal (3000 per c.mm.). The count done on the 23rd day, when the patient had just become afebrile and the glandular enlargement was subsiding, showed an identical qualitative picture, though the absolute number of mononuclears was halved. The granulocytes at this stage were very low—1000 per c.mm. sulphapyridine had been used in treatment but the doses were not large and were not continued for more than a week. This granulocyte leucopenia was still present on the 38th day, when convalescence was established and the glandular enlargement had almost disappeared. There were then only 1245 granular cells per c.mm. The mononuclear group were not greatly reduced from the high count of the 23rd day, but there was a striking change in the type of cell. Within the mononuclears the abnormal lymphocyte-monocyte group was down to 365 cells per c.mm. (compared with 6230 and 3200 in the two previous counts), while lymphocytes of normal staining reaction and morphology now constituted almost the whole of the mononuclear leucocytosis.

Paul-Bunnell test.—The small quantity of serum available from the 14th day blood sample was used for the Paul and Bunnell (1932) sheep red-cell heterophile agglutinin test. This gave positive agglutination to a titre of 1/2048 (serum dilution). This result affords very strong confirmatory evidence of glandular fever. The patient gave no history of having received injections of horse serum.

TABLE II—BIOCHEMICAL REACTIONS OF ORGANISM CULTURED FROM PATIENT'S BLOOD

	Strain of organism			
	B Ch-G	58-XXIII	Schultz, LLS	Gibson, EF
Monosaccharides				
Pentoses—				
Arabinose ..	O	O	O	O
Xylose ..	O	A(tr)	A(tr)	A(tr)
Hexoses—				
Glucose ..	A	A	A	A
Galactose ..	A	A	A	A
Disaccharides				
Saccharose ..	A	A(late)	A(late)	A(late)
Maltose ..	A	A	A	A
Lactose ..	A(late)	A(late)	A(late)	A(late)
Polysaccharides				
Starch	A	O	O	O
Inulin ..	O	O	O	O
Dextrin ..	A	A	A	A
Alcohols				
Mannite ..	O	O	O	O
Dulcite ..	O	O	O	O
Litmus milk ..	A(tr)	A(tr)	A(tr)	A(tr)
Gelatin	O	O	O	O
Indol	O	O	O	O
Methyl red test	+	+	+	+
Voges-Proskauer reaction ..	O	+ (tr)	+ (tr)	+ (tr)

A = acid production without gas. tr = trace. + = positive reaction. O = no change.

ISOLATION OF *List. monocytogenes* FROM THE BLOOD

The small amount of arm-vein blood taken into a dry sterile centrifuge tube on the 14th day of disease was brought to the laboratory 30 miles by car, and was 3 hours old when cultured. The blood-clot was transferred with strict precautions to a screw-capped bottle containing 100 c.cm. of nutrient broth, to which the adjuvant 'Liquoid' (Roche) had been added before autoclaving to make a concentration of 0·05%. Reported tests (von Haebler and Miles 1938) indicate that this substance is an effective anticoagulant and destroys the normal bactericidal power of human blood for a large number of pathogenic organisms.

The broth was incubated aerobically at 23° C., and after 6 days, when visible turbidity was well-marked in the supernatant fluid, was plated out on blood-agar. Profuse growth appeared on the plates after overnight aerobic incubation at 37° C. Isolated colonies were about 1–1·5 mm. in diameter, round, convex, smooth, glistening and transparent, with entire edges. They were butyrous in consistency and emulsified readily. Small zones of hæmolysis which subsequently became complete surrounded the colonies. No rough variants were present.

Microscopical preparations showed gram-positive rods, rather thin and short (0·5μ by 2–3μ), arranged singly and in side-by-side packets. There were no capsules or spores. The organism was fairly actively motile (especially when grown in glucose broth at 23° C. rather than at 37°). The morphological and cultural characters of the organism strongly suggested *List. monocytogenes*. Its biochemical activities were therefore investigated and compared with those of three stock strains of this organism—namely, "58-XXIII-1924" (original Cambridge guineapig strain: Murray, Webb and Swann 1926) "Schultz LLS-1933" (human strain from California; Schultz, Terry, Brice and Gebhardt 1934, Webb and Barber 1937); and "Gibson EF-1934" (human strain

* The generic name *Listerella*, proposed by Pirie (1927), was disallowed in September, 1939, by the Third International Congress for Microbiology, meeting in New York City, on the ground that the name had already been used by Jahn in 1906 for a mycetozoan. It was therefore proposed (Pirie 1940) that the name *Listeria* be substituted.

from Scotland: Gibson 1935, Webb and Barber 1937). The comparison is given in table II, the strain of organism from the present case being termed "BCh-G."

The results obtained with strain BCh-G showed only minor divergencies from those of the three stock laboratory strains and are compatible with true identity of species among the four strains under comparison.

AGGLUTINATION TESTS

Cross-agglutination tests between the organism BCh-G and *List. monocytogenes* (original rodent strain 58-XXIII) were next carried out. The results are given in table II.

Antisera were prepared in rabbits by intravenous injections of flagellar antigens. The latter are obtained in greatest concentration by growing the organisms in 1% glucose broth, incubated for 18 hours at 23° C. Growth at this low temperature, as McGaughey, quoted by Paterson (1939) has shown, produces actively motile (flagellated) listeria in great numbers. The broth bottles, uniformly turbid, were diluted with sterile broth to moderate density (bacterial count of 1000 million per c.cm.). The cultures were killed by the addition of formaldehyde to a concentration of 0·25%. The rabbits were given a first dose of 0·5 c.cm. and a second dose of 1 c.cm. after 21 days, and the serum was harvested from ear-vein blood on the 21st day after the second injection. It was not heated and was stored at 4° C. without preservative. Suspensions for agglutination were prepared as for inoculation and the reactions between antigen and antibody read after an hour in the 53° C. water-bath, and again after 4 hours and 24 hours. The later readings were always identical with the first. Clumping was of the large, soft flake type, characteristic of flagellar agglutination. The titres given are in terms of the final dilution, after addition of the suspension.

TABLE III—AGGLUTINATION TESTS

Suspension of organism	Titre of antiserum prepared against	
	58-XXIII (rab. 41/33)	BCh-G (rab. 41/37)
58-XXIII	1/50,000	1/25,000
BCh-G	1/50,000	1/25,000

The titre of agglutinins obtained in these two sera was high, the 58-XXIII rabbit outdistancing the BCh-G rabbit by a one-tube end point (doubling dilutions were employed in the tests). The table shows a cross-agglutination result which gives no indication of any antigenic differences in the two strains. Each was agglutinated by the other's antiserum to full titre.

Agglutinin-absorption tests were done, using the strong 1/50,000 58-XXIII antiserum. Table IV shows the results.

For absorption, thick emulsions containing between 50,000 and 100,000 million organisms per c.cm. were prepared for the washed deposit of formolised broth cultures grown at 23° C. Two c.cm. of emulsion and two c.cm. of antiserum

TABLE IV—AGGLUTININ-ABSORPTION TESTS

58-XXIII serum (titre 1/50,000)	Titre after absorption
Absorbed with 58-XXIII suspension	0
,, ,, BCh-G ,,	1/50–1/100 (tr)

diluted 1/5 were mixed and heated in the 53° C. water bath for 4 hours, the tubes being inverted every 30 minutes. After storing at 4° C. overnight the mixtures were centrifuged and the supernatant fluid (now representing an antiserum dilution of 1/10) was mixed with an equal amount of a fresh thick emulsion and the whole process repeated for this second absorbing dose. The resulting supernatant fluid (now representing antiserum diluted 1/20) was set up in the usual way against an ordinary suspension of the homologous organism, to test for the presence of residual antibody.

The absorption tests indicate that the BCh-G organism has a flagellar antigenic constitution almost, but not quite, identical with that of the rodent *List. monocytogenes*, since BCh-G was apparently not capable of removing from the test antiserum every trace of flagellar antibody which the homologous organism had induced. The difference in flagellar antigens is, however, slight; of an order which indicates strain variety within species identity.

The BCh-G strain will be tested against monospecific flagellar and somatic antisera, prepared by absorption methods for the purpose of distinguishing small variations in the antigen complex, and the details published later. Several investigators have examined strains of listeria to determine the antigenic structure. Paterson (1939, 1940a) used both a flagellar and somatic antisera and concluded that four types of listeria could be distinguished. He was unable, however, to correlate these types with the zoological species of the hosts or with the geographical distribution of the sites of discovery.

TABLE V—LEUCOCYTES IN RABBITS AFTER INTRAVENOUS INOCULATION OF BCH-G

—	Total white cells	Polymorphs		Lymphocytes		Monocytes	
		%	abs.	%	abs.	%	abs.
BCh-G: 37 million i.v. (rab. 41/75: 1560 g.)							
Pre-injection count	7000	38·0	2660	58·0	4060	4·0	280
After 48 hr. ..	10,900	38·0	4141	44·0	4795	18·0	1960
,, 72 ,, ..	12,000	30·0	3600	38·0	4500	*32·0*	*3840*
,, 96 ,, ..	10,900	29·5	3215	55·0	5995	15·5	1690
,, 6 days ..	10,400	39·0	4055	49·0	5095	12·0	1250
,, 9 ,, ..	9200	43·5	4370	47·5	4000	9·0	830
,, 12 ,, ..	7200	35·0	2520	59·0	4250	6·0	430
BCh-G: 150 million i.v. (rab. 41/76: 2370 g.)							
Pre-injection count	8700	30·0	2610	64·0	5570	6·0	520
After 48 hr. ..	12,300	19·0	2340	59·0	7255	22·0	2705
,, 72 ,, ..	19,600	36·0	7050	34·0	6665	30·0	5880
,, 96 ,, ..	20,700	30·0	6210	38·5	7970	*31·5*	*6520*
,, 6 days ..	12,600	34·0	4285	48·0	6050	18·0	2265
,, 9 ,, ..	9800	29·0	2840	59·0	5785	12·0	1175
,, 12 ,, ..	8800	30·5	2685	60·0	5280	9·5	835

BIOLOGICAL TESTS

Production of a monocytosis in rabbits.—The experimental inoculation of rabbits with pure cultures of *List. monocytogenes* was shown on the first discovery of this organism to result in a rise in the monocytes of the circulating blood (Murray, Webb and Swann 1926). This finding has been repeatedly confirmed, confirmed indeed for every strain subsequently isolated, and failure to reproduce the reaction would cast serious doubt on the identification of an organism as a member of the listeria group. The BCh-G strain was thus tested in two rabbits.

Motile glucose-broth cultures were prepared, diluted if necessary with sterile broth, and injected, living, into the ear veins of the rabbits. White-cell counts were made before and after injections.

Both of the doses chosen for injection proved to be sublethal and produced a circulating monocytosis, the peak of the rise in the first rabbit coming at 72 hours after injection and in the second at 96 hours. In the animal receiving the larger dose the degree of response, a rise in monocytes from 280 to 6520 per c.mm., is equal to the average found in the first experimental inoculations at Cambridge, though not approaching the record rabbit of that series in which a pre-injection count of 230 monocytes per c.mm. was increased to 15,100 per c.mm. (56% of 27,000 white blood-cells).

Rabbit and mouse lesions after lethal doses.—In the experimental disease in rabbits the most conspicuous lesion is a fine focal necrosis of the liver, in the typical case appearing as a uniform white mottling or speckling, pin-point to pin-head in size, covering the whole surface of the liver and extending throughout its substance. Three rabbits were given lethal doses of the BCh-G organism.

Motile living glucose-broth cultures grown at 23° C. were used for inoculation. The rabbits were all young adults weighing between 1500 and 2000 g. Rabbits 41/60 and 41/61 received 450 million organisms each intravenously and died at 96 hours and 108 hours respectively. Rabbit 41/71 was given 750 million organisms and was killed at 72 hours, being then moribund.

Focal necroses in the liver were found post mortem in all three rabbits. They were least well marked in the first animal which died 96 hours after inoculation, being obscured by extensive fatty degeneration of the liver parenchyma. A marked toxic effect on the liver epithe-

lium is not uncommon after intravenous injection, especially when the animal is overwhelmed by the infection.

Microscopical sections of the mottled livers showed that the foci consisted of small circular areas of reticulum with fairly large pale nuclei (mononuclear cells) scattered through its meshes. Fragments of nuclear detritus were present in each focus, especially at the margins, with occasional polymorphonuclears and lymphocytes and the remnants of degenerate liver epithelium. Stained by the Jensen-Claudius Gram method the foci, even under low power, were outlined by darkly stained clusters of listeria. Single organisms and packets of twos and threes were also present, some phagocytosed by Kupffer cells and others extracellular, suggesting that the foci were due to aggregations of bacilli impacted in the liver sinusoids. The appearances in the liver were identical with those encountered often over a period of years in intravenous inoculations of rabbits with numerous strains of *List. monocytogenes*.

The spleens of the rabbits were moderately enlarged and contained similar foci, though smaller and less numerous. They were most often found at the margins of the malpighian bodies and in gram-stained sections were demarcated by the dark bacterial clusters at the edges. Phagocytosis of the bacilli by mononuclear cells was a conspicuous feature.

Naked-eye lung lesions were present in all, but were most marked in rabbit 41/60, which lived for 4 days after inoculation. Multiple greyish-white nodules up to 1 mm. in diameter were present in both lungs, from apices to bases, subpleurally and in the lung substance. The microscopical appearances were similar in general characters to the focal necroses of the liver, but with more prominent central mononuclear cells, some of which showed pinkish necrotic change, like the caseation of the epithelioid cells of miliary tubercles. Giant-cell systems containing up to 20 or more nuclei could be found sparsely in a few of the foci, resembling the Langhans cell of tuberculosis. Listeria were present in the margins of the foci: in one or two of the giant cells poorly staining, partly digested phagocytosed bacilli could be seen.

The astonishing similarity of these lung lesions to pulmonary tuberculosis, both in the gross and microscopically, were noted some years ago (Webb 1935). The group of American workers who fractionated the lipoids of the tubercle bacillus (Cunningham, Sabin et al. 1925, Sabin and Doan 1927, Sabin, Doan and Forkner 1930) maintained that the mononuclear cell ("epithelioid" cell) reaction in the tissues of man and animals —the "tubercle"—is a specific response to the fatty acid, phthioic acid, which they isolated from the waxy envelope of *Mycobacterium tuberculosis*. Under appropriate conditions, *List. monocytogenes*—a non-waxy, non-acid-fast, rapidly growing gram-positive rod—can reproduce in the rabbit every feature of this tissue response.

In each of the three inoculated rabbits the organism was recovered after death from the heart's blood.

Two white mice were given intraperitoneal inoculations of the BCh-G strain.

Cultures were prepared as for the rabbit experiments. The mice were young adults, weighing about 20 g. Mouse 41/64 was injected with 300 million organisms and mouse 41/65 with 750 million organisms. The former died 70 hours and the latter 90 hours after injection.

The lesions in both mice were similar and resembled those in rabbits, with the exception of lung "tubercles" which were absent in the mice. The foci in the spleens were less prominent. This has been noted before and is due to a more generalised and less focal mononuclear cell reaction. The organism was recovered from the heart's blood in both mice.

Two mice were also inoculated with the listeria strain, 58-XXIII (original rodent). Both died within 72 hours and the post-mortem lesions were identical with those of the BCh-G strain experiments.

Rabbit conjunctivitis test.—The ocular reaction first reported by Anton (1934) was tried in three rabbits.

In the experiment with rabbit 41/59 a cotton-wool swab was dipped in a motile glucose-broth culture of strain BCh-G (1500 million organisms per c.cm.) and rubbed gently over the conjunctiva. With rabbit 41/72 the application was made twice, but in both experiments the result was negative. The third rabbit, 41/77, was given two conjunctival swabbings with the concentrated, centrifuged deposit from a 100 c.cm. broth culture flask in which the number of organisms was 50,000 million per c.cm.

With this larger dose an acute conjunctivitis appeared in 24 hours. The lids were swollen and matted together with a thick creamy exudate in the inner canthus. Films from this showed numbers of mononuclear cells and a few polymorphonuclears and both phagocytosed and extracellular listeria. After 48 hours the cornea became involved, with cloudy infiltration and vascularisation, and the inflammatory reaction appeared to be at its height. It was subsiding at 72 hours and at 96 hours had almost disappeared. Within the next day or two no trace of the condition could be found, nor was there any residual scarring. The rabbit showed few constitutional symptoms and retained its appetite throughout.

Morris and Julianelle (1935), Julianelle and Pons (1939) and Julianelle (1940) confirmed Anton's results and extended the eye test to include twenty-two listeria strains, all of which gave positive results, and numerous control organisms, including ten strains of Erysipelothrix, none of which produced a conjunctivitis. These observers suggested that the eye reaction provides an even more specific test for listeria than the induction of a circulating monocytosis in rabbits, and it is true, as Barber (1939) working in my laboratory on a comparison of listeria and erysipelothrix found that other organisms than listeria can stimulate the monocytes.

The cumulative evidence of the three biological tests, together with its cultural and serological reactions, leaves no doubt that the BCh-G organism is a true strain of *List. monocytogenes*.

LISTERIA AGGLUTININS IN THE PATIENT'S SERUM

The patient's serum was available for test against listeria suspensions on two occasions—namely, from vein blood samples taken 37 days and 12 months after onset.

The unheated serum was set up against fresh motile 23° C. glucose-broth cultures (flagellar antigen predominant) which had been killed by the addition of formaldehyde to a concentration of 0·25%. After incubation in a 53° C. water-bath the results were read at 1 hour, 4 hours and 24 hours. The titre noted is the final dilution, after addition of the suspension. The test strains were 58-XXIII and BCh.-G.

Both serum specimens gave faint agglutination in a dilution of 1/25, a titre which is not significant.

NATURAL INFECTION IN ANIMALS

List. monocytogenes was first isolated (Murray, Webb and Swann 1926) from guineapigs and rabbits during an epizoötic among laboratory breeding stocks at Cambridge in 1924. The animal lesions, both natural and experimental, were described and among them multiple small focal necroses of the liver and an increase in the number of circulating monocytes were the two most conspicuous features. Because of this constant monocytosis the name first given to the organism was "*Bacterium monocytogenes*."

Harvey Pirie (1927), during plague survey studies on rodents of the South African veld, recovered the same organism from a gerbille in 1925, the animal being picked up near Tiger River station in Orange Free State. He proposed a new generic name, "Listerella," in honour of Lord Lister, and the species name, "*hepatolytica*," to indicate the liver-cell necrosis. When apprised of the prior claim of the Cambridge workers, he suggested *Listeria*, in preference to *Bacterium* (*monocytogenes*), since the genus bacterium was being reserved for gram-negative aerobic rods. Pirie carried out experimental inoculations in several animal species, and, finding dogs, cats and monkeys resistant to infection with the new organism, concluded that it was harmless to man and to domestic animals. He therefore laid it down in burrows in field trials, hoping to establish it as a gerbille exterminator in the form of epizoötic disease among rodent colonies. He failed—perhaps fortunately—in his attempt.

These remained the sole examples of animal infection due to listeria until 1930, when simultaneously in New Zealand (Gill 1931, 1933, 1937) and New Jersey, USA (Ten Broeck recorded by Seastone 1935) a meningo-encephalitis of sheep was found to be due to this organism. Because the affected animals showed a tendency to walk

in circles with the head retracted to one side the condition was known by the local name of "circling disease." Increasing dullness and somnolence, with death in coma, was the usual outcome of an attack. Listeria was recovered in pure culture from the brain-stem and the condition was reproduced in normal sheep by experimental inoculation.

Jones and Little (1934) studied from 1930 onwards cases of serious disease among New Jersey cows, with the symptoms and signs of encephalitis, and in many of the fatal cases they recovered listeria without difficulty from the brain substance. The condition was readily reproduced experimentally with the cultures so isolated.

Since those first reports, Listeria meningo-encephalitis and encephalo-myelitis in sheep and cattle, and in goats and swine as well, have been recorded from numerous places in the United States, from Russia and from Germany.

Abortion in cattle (United States) and in sheep (England), with recovery of listeria from the organs of the aborted fœtuses, has occurred in two small epizoötics. In these cases the organism, though present in the placenta, had made no further invasion of the maternal tissues and the aborting animals suffered no sequelæ.

Listeriosis of fowls produces the same focal liver necrosis as seen in rodents and in addition massive necrosis of the myocardium. Extensive outbreaks with a high mortality have been observed in the United States and in England.

A distemper-like disease of foxes, occurring on a silver fox-fur farm in Illinois, was likewise proved to be due to listeria.

The organism is obviously widely distributed in nature, capable of attacking many animal species, and protean in the type of disease which it produces. Among animal reservoirs in which it is maintained ruminants must be of first importance. It is a curious fact that only once since 1924–25 has rodent listeriosis been recorded. This was in a single pregnant rabbit at Cambridge, on the exact site of the original rabbit and guineapig epizoötic of 16 years before (Paterson 1940b). No listeria infection in rats has yet been described, though the plague-prevention services of many countries provide much post-mortem material from the rat population.

INFECTION IN MAN

Listeria meningitis and meningo-encephalitis in man—analogous to the infection of sheep and cattle—was first observed in Connecticut, USA, in 1933 by Burn (1934).

The organism was isolated from the blood of a day-old infant, dying after a short illness in which cyanosis, dyspnœa and drowsiness were the main features. At autopsy focal necroses in the liver were found and the organism was recovered in pure culture from the heart's blood (brain examination was not permitted).

Schultz, Terry, Brice and Gebhardt (1934) observed the second case in California in 1933. This was in a nurse aged 44, and, although the meningo-encephalitis ran a severe course with a residuum of permanent speech and motor-defect, the patient recovered. Listeria was isolated from the cerebrospinal fluid on twelve separate occasions.

Burn reported two further cases in infants, and a fourth case in a man of 53, in 1934, all in Connecticut. Each was fatal and the organism was recovered from the brain, blood and viscera. His strains, together with that of Schultz and his colleagues, were inoculated into rabbits, guineapigs, mice and monkeys (Burn 1935) and the lesions produced included focal necrosis of the liver and meningeal exudates with mononuclear cell reaction. Listeria was recovered again from the inoculated animals, though with greater ease from the viscera than from the heart's blood.

To these five cases, starting in 1933, there have been added to date nine more, making fourteen in all. Eight of the fourteen were fatal. The age-incidence ranged from one day to 67 years. Eleven were males, three females. The countries of origin were, United States (both eastern and western seaboards and the middle west), Scotland, Uruguay and the Argentine. The first case in Great Britain (Gibson 1935) was published as an unusual type of diphtheroid bacillus meningitis (fatal) in an Edinburgh labourer. We subsequently obtained this culture from Gibson and showed that it was listeria (Webb and Barber 1937). Only two cases have thus been reported from the British Isles, both from Scotland. The second (Wright and MacGregor 1939) was likewise fatal, a meningitis in a male infant aged 17 months, in Stirlingshire.

In none of the fourteen cases was it possible to trace the infection to an animal source. It is indeed remarkable that in the 16 years since listeria was first described no-one has isolated it from a normal animal or human (with the possible exception of one positive fæcal culture from a normal fowl in Cambridgeshire)—that is to say, the carrier state has not been demonstrated. And this in spite of the world-wide distribution of cases of the disease.

In addition to the fourteen proven cases, listeria meningitis in man is suggested in reports long before Burn described his first case (1934). Atkinson (1917), for example, observed a small outbreak of meningitis in children in Perth, Australia, in 1915. The description of the organism isolated from the cerebrospinal fluid is very like listeria, though proof is lacking as the cultures were not preserved. Dumont and Cotoni (1921), however, who isolated a gram-positive rod from a fatal case of meningitis in an Italian soldier in the Champagne country of France in 1918, maintained their organism by laboratory subculture, and it was proved by Paterson (1940a) 22 years later to be a strain of true listeria.

These examples are not exhaustive. Listeria meningitis has undoubtedly occurred with some frequency in the past, sporadically and in small epidemics in man, in more extensive epizoötics among animals, and its occurrence in the future in major epidemic, or even pandemic, form awaits only a favourable combination of circumstances. Fortunately the sulphonamide treatment promises success. The fatality-rate in the fourteen reported cases was 71%, but only two of them were so treated.

Wagner and Porter (personal communication 1938) in their Iowa case gave sulphanilamide in large doses and considered that the drug was responsible for the patient's rapid recovery. Savino (1940a, b, 1941) in the Argentine also had a dramatic cure with sulphapyridine therapy.

A previous report (Webb 1939) had been made on the use of sulphanilamide and sulphapyridine, combined with antiserum, in treating experimental listeriosis in mice; 350 mice were used and the drugs given by mouth in repeated doses, the antiserum by intraperitoneal inoculation. A 60% survival-rate after 100 lethal doses of listeria (rodent strain) was obtained with sulphanilamide alone; 90% survival with sulphapyridine. After 200 lethal doses the sulphanilamide survival-rate fell to 27%; the sulphapyridine to 73%; but on combining the latter drug with antiserum (rabbit) prepared against the strain used for inoculation the survival-rate rose to 100%; and even after 1000 lethal doses 90% of mice survived. This combination of sulphapyridine with specific listeria antiserum has yet to be tried in human cases.

RELATION TO INFECTIOUS MONONUCLEOSIS

The rôle of listeria in glandular fever, however, is still open to question. It has not yet been found in a sufficient number of cases to establish a strong claim as the cause—or at any rate the sole cause—of this disease. Other agents, too, dispute its claim.

Bland (1930, 1931) in London found a protozoon, *Toxoplasma*, in the spleens of rabbits injected with glandular-fever blood. As the animals showed a leucopenia with a relative mononucleosis he concluded that the protozoon might have been transferred in the injected blood and so be the causal agent both of the human and the experimental disease.

Van den Berghe and Liessens (1939a, b) and with Kovacs (1939) suggested a virus origin. These workers, in Belgium, injected glandular-fever blood into a monkey and produced a febrile disease with leucopenia, a relative monocytosis and a high Paul-Bunnell titre in the serum. The condition was transmissible through serial passage to other monkeys by the injection of Seitz-filtered blood, taken at the height of the fever.

Wising (1942) likewise suggests a virus origin. After injecting six normal medical students with lymph-node suspensions, three others with whole blood, and two more with filtered plasma, all obtained from glandular fever patients in Stockholm, he observed the development of the disease (typical clinical features and blood-picture) in one. In this subject whole blood, unfiltered, had been inoculated; the Paul-Bunnell reaction became positive to a titre of 1/32. No cultures from this experimental subject are recorded. Monkeys injected in a similar fashion gave, on the whole, negative

results. Wising is against the view that *List. monocytogenes* can cause the disease. He failed to isolate any organism by blood-culture in twenty-one glandular fever patients (30 attempts), or by lymph-node culture in sixteen attempts (Friedländer's bacillus, staphylococci and "pseudo-diphtheria" organisms grew in three or four of these cultures). Injections of heat-killed listeria (two of Nyfeldt's glandular fever strains) intradermally in glandular fever convalescents gave no striking skin reactions. And intravenous heat-killed listeria in normal subjects, though producing high agglutinin titres for *List. monocytogenes*, failed to raise appreciably the Paul-Bunnell titres of those individuals. Wising makes, however, the remarkable statement that his inoculation of the Nyfeldt listeria strains into rabbits in lethal doses produced no lymph-node enlargement, no significant monocytosis and no macroscopic lesions in any of the internal organs!

The suggestion that listeria might be the cause of glandular fever came from Aage Nyfeldt, Copenhagen, and was made soon after publication of the Cambridge paper describing the organism and its effects in rabbits. He was struck with the similarity in blood-pictures and began to take systematic blood-cultures from such cases as came his way. In March, 1929, he first reported (Nyfeldt 1929, 1932) the successful isolation of *Bacterium monocytogenes* ("*hominis*") from the blood of a typical case of infectious mononucleosis in the Blegsdam Hospital, Copenhagen. Two months later he obtained his second positive blood-culture, and this was followed in March, 1930, by a third. The three cases, all from the Copenhagen district, were described as having typical clinical histories, enlarged cervical lymph-glands and raised temperatures, and each showed a great increase in the mononuclear cells of the circulating blood (the paper of Paul and Bunnell was not published until 1932, so the evidence of that test was not available for confirmation). These reports of Nyfeldt's attracted little attention, and were not quoted in subsequent publications on infectious mononucleosis, even in discussions on the ætiology of the disease. In November and December, 1937, four further cases of glandular fever provided additional positive cultures of the organism (Schmidt and Nyfeldt 1938). The patients, two young males and two young females, were seriously ill and showed signs of meningo-encephalitis though all four recovered. Listeria was isolated from the cerebrospinal fluid in each case and from the blood as well in two of them. Paul-Bunnell agglutination was positive with significant titres (1/64 to 1/512). Nyfeldt subsequently obtained three more strains of listeria from glandular fever cases in Denmark, and when he visited England in 1938 he submitted his ten strains to test. They cross-agglutinated with the strains in my collection, and Paterson (1939, 1940a) in Cambridge found them to constitute a distinct antigenic group possessing flagellar antigens A and B and somatic antigens II (III), IV, of which the last was unique among listeria strains.

No confirmation of Nyfeldt's results was forthcoming until ten years after his first case. Then, in 1939, Pons and Julianelle (1939) reported the recovery of *List. monocytogenes* from the vein blood of a girl in New Jersey, USA, with typical glandular fever.

The patient had a raised temperature, a sore throat, enlarged cervical and axillary lymph-glands and a palpable spleen, but showed neither meningeal nor cerebral symptoms. The white cells rose to 17,700 per c.mm., with 88% mononuclears (lymphocytes and monocytes in equal numbers). A single Paul-Bunnell test was positive to a titre of 1/128. The blood-culture, taken on the 9th day, gave a profuse pure growth of listeria colonies on plating out after four days' incubation at 37° C. Animal inoculations with the strain produced death with the classical listeria lesions, the rabbit eye-test gave a severe conjunctivitis, and when the organism was studied in Paterson's series it was found to contain flagellar antigens A and B, and somatic antigens I, II, (III), thus differing from Nyfeldt's Danish glandular fever strains in the possession of somatic antigen I and in the lack of somatic antigen IV. The Pons and Julianelle strain, though American in origin, was antigenically identical with the original Cambridge rodent strains isolated 13 years before.

My case in England in 1941 furnishes the third instance—in yet another country—of the association of *List. monocytogenes* and infectious mononucleosis.

Agglutinins against listeria have been sought for in glandular fever blood on numerous occasions.

In Nyfeldt's first case the patient's serum agglutinated the homologous listeria strain to a titre of 1/250. The patient had then been afebrile for five days. Julianelle (1940) tested thirty-five "typical" glandular fever sera against two listeria strains, one of rodent, one of ruminant origin. Agglutination was not very marked, the titres varying from 1/20 to 1/160. Janeway and Dammin (1941) found very moderate grades of agglutination (titres from 0 to 1/40) when thirteen glandular fever sera were set up against two listeria strains of human meningitis origin. Fifteen sera from patients with miscellaneous disease gave titres from 0 to 1/80.

My own findings in nine consecutive cases with typical blood-pictures and positive Paul-Bunnell reactions at 1/256 or higher were variable.

The first (25th day of disease) was negative (less than 1/25); the second (21st day) positive at 1/125; the third (11th day) negative; the fourth (14th day) positive at 1/250; the fifth (30th day) positive at 1/500; the sixth (11th day) negative; the seventh (7th day) negative, but positive at 1/125 on the 18th day; the eighth (12th day) positive at 1/125; and titre unchanged on 19th day; and the last (12th day) positive at 1/125. A third of the total gave negative results from single tests, but the change from negative to positive in the seventh case after an interval of 11 days is significant. In testing twenty-five sera from routine Wassermann blood samples I found all to be negative, but in forty-nine from hospital patients with various diseases there was positive listeria agglutination in thirteen. A titre of 1/25 was observed with six sera, 1/50 with five, 1/100 with one, 1/125 with two. In all these tests both rodent and human strains were used as antigens.

Until something more is known about the carrier incidence in the general population, listeria agglutinins in miscellaneous blood samples remain unexplained. The absence of these agglutinins in any appreciable quantity in the blood of some glandular fever patients, however, is certainly evidence against listeria as the cause of the disease in those cases. But to be fairly assessed it is clear that each case should be established as unequivocal glandular fever—using all known criteria—and repeated agglutination tests should be done throughout the febrile stage of the disease and well into convalescence.

High-titre listeria agglutinins in rabbits can be produced at will by injections of listeria cultures, living or dead, though inoculation of man with vaccines has not been tried on a large scale. It has been argued that, if listeria is the cause of infectious mononucleosis in man, then rabbit injections ought to be followed by the formation of heterophile sheep red-cell agglutinins. Kolmer (1939) tried out this hypothesis. In sixteen rabbits given repeated intravenous injections of two strains of listeria Paul-Bunnell tests were negative. This constituted, in his view, evidence of some weight against the organism as the ætiological agent. The evidence is adverse, but it would be weightier if undoubted cases of infectious mononucleosis were not known to occur in which negative Paul-Bunnell reactions are found throughout the course of the infection.

The search for listeria ought to include systematic cultures of the enlarged superficial lymph-glands, especially in the early stages of an epidemic of infectious mononucleosis. Baldridge, Rohner and Hansmann (1926) carried this out in six cases among Iowa university students and recovered from four a short gram-positive rod. It was considered to be a diphtheroid, possibly a contaminant, and was not further identified (the description of *List. monocytogenes* only appeared in that same year). I have recently cultured two axillary lymph-nodes from undoubted cases, nodes sent in from ward biopsies, but a heavy growth of contaminating organisms spoiled the cultures.

In a few cases trial of sternal bone-marrow cultures has proved no more successful than vein blood. Where vein blood-culture has given a negative result, animal inoculation with 3 c.cm. of whole blood has not, in the few attempts made, produced listeria infection.

It is my own conviction, however, that isolation of listeria from cases of true glandular fever will grow more frequent with intensive study. It may well be that listeria bacteriæmia is intermittent, or early and transient, in its manifestation. The disease is often not diagnosed until a blood-count is made and the lymph-gland enlargement already well marked. Bacteriological studies of early

cases, especially of early epidemic cases, appear to offer the most promising chance of success.

SUMMARY

1. *Listeria monocytogenes* was isolated by blood-culture from a typical case of glandular fever in eastern England in 1941. This is the third observation of its kind: in the two previous instances the countries of origin were Denmark and the eastern United States of America.

2. The cultural and biological tests for this organism, including the appearance of the lesions in experimental animals, are given.

3. The natural history of disease in animals caused by listeria ("listeriosis"), and the relation of listeria to certain types of human meningitis and meningo-encephalitis and to infectious mononucleosis, is discussed.

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VITAMIN A AND DARK ADAPTATION

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DURING a study of the complete dark-adaptation curves in about 400 apparently normal people, several points of interest emerged relating to the course of dark-adaptation and the effect upon it of vitamin A. Some of these have a bearing on the general problem of dark-adaptation.

TECHNIQUE

The course of dark-adaptation was measured by the apparatus described by Haines (1938; see also Yudkin 1941). The instrument has been modified somewhat from the original one as supplied by Messrs. Crookes.

The subject is told to look along a tube 14 in. long, whitened on the inside, which can be illuminated by a bright lamp for the preliminary bright-adaptation. The 60 watt lamp in the original instrument was replaced by one of 75 watts; the bright-adapting light is then of the order of 500 millilamberts. The test objects are arrows subtending an angle of 6° at the eye, cut out of a plate at the further end of the tube. The plate may be rotated by the observer so that it presents either a blank white surface (for bright-adaptation) or one of four arrows pointing in one of four different directions (for dark-adaptation). The intensity of the test light, which illuminates the arrows from behind, can be controlled by a combination of neutral filters and a pair of polaroid discs, one of which can be rotated, thus reducing by a desired amount the intensity of the transmitted light. The neutral filters, of which there are three with transmissions of about 1/10, 1/100 and 1/1000, are fixed on a rotating wheel with four apertures. Thus, by using the polaroid discs alone or in combination with one of the three filters, the illumination may be varied continuously over the range from about 10^7 down to 10^3 or less micro-micro-lamberts (i.e., from 7 to 3 log. $\mu\mu$l).

The test is conducted in the following way. The bright adapting light is switched on and the subject is instructed to rest his head against the end of the tube and look along it. He is told to keep moving his eyes about so that as large an area of the retina as possible is adapted to the bright light. After exactly 7 minutes, the bright light is replaced by the test light, and the plate carrying the arrows is rotated so that one is in place. The polaroid disc has previously been set at the position of maximum transmission and the wheel carrying the neutral filters arranged so that no filter is in the path of the test light. In other words, the arrow is illuminated by the maximum amount of light. As soon as the subject sees the arrow—after about 20 or 30 seconds—the time is noted and the polaroid disc is rotated to decrease the illumination by about 0·1 or 0·2 log unit. Again the time is noted when the arrow is seen and again the illumination is reduced. The procedure is repeated until 30–40 minutes have elapsed, when dark-adaptation is usually complete. The polaroid disc is never rotated more than will reduce the transmission to 10%, since after this the colour value of the transmitted light begins to alter; the next reduction in illumination below 10% is brought about by putting in the next lower neutral filter and turning the polaroid disc back to the position of maximum transmission. After the initial rapid adaptation during the first minute, the reliability of the subject's answers may be checked by asking him to state the direction of the arrow, which is rotated at intervals. The subject is encouraged, especially after the first few minutes of dark-adaptation, to allow his eyes to move about and so to find the position of maximum sensitivity of his own retinæ. We have never encountered any difficulty in getting the subject to do this, and he quickly learns to look in the direction which enables him to see the arrow best. After 15–20 minutes, when the progress of the adaptation is slow, the subject is asked to close his eyes, and lean back in his chair for a minute or two at a time, and thus only to look along the tube at intervals. This considerably relieves the strain, which is accentuated towards the end of the test by the fact that it may take 10 minutes or more to see the next lower illumination. After 30 minutes of adaptation, the threshold is usually determined by a procedure which is the reverse of that used in the earlier part of the test—the minimum detectable illumination is determined by increasing the light until the arrow is just seen and then slowly reducing it until it disappears. This is repeated once or twice at about 30 minutes, again at about 35 minutes and lastly at about 40 minutes.

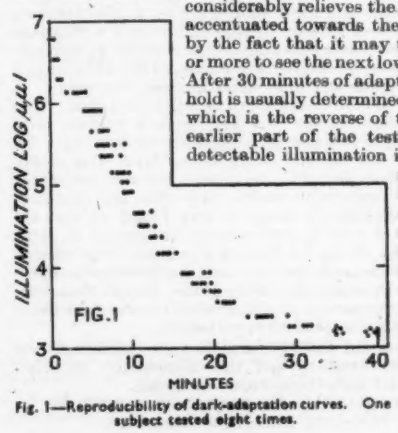
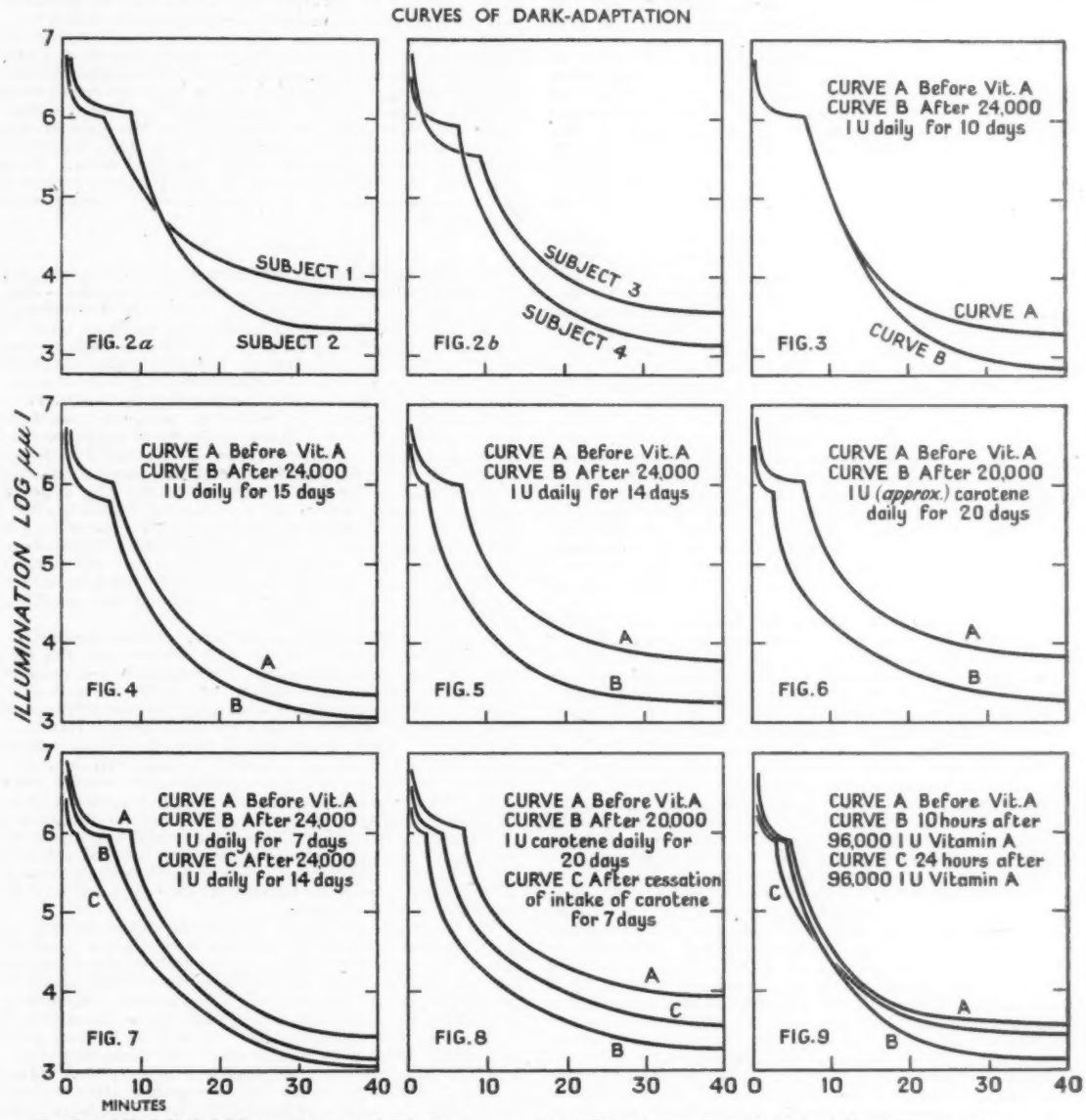


Fig. 1—Reproducibility of dark-adaptation curves. One subject tested eight times.

* Sir Halley Stewart Research Fellow.



Figs. 2a and 2b—Individual differences in curves of dark-adaptation.
Fig. 3—Change in rod threshold only.
Fig. 4—Change in cone threshold and rod threshold.
Fig. 5—Change in rod threshold and transition time.
Fig. 6—Change in cone threshold, rod threshold and transition time.
Fig. 7—Gradual improvement with continued administration of vitamin A.
Fig. 8—Improvement after administration of carotene; relapse after cessation.
Fig. 9—Transitory changes produced by one large dose of vitamin A.

Figs. 3–9 illustrate various effects of vitamin A on dark-adaptation.

RESULTS

Altogether we have measured the complete course of dark-adaptation of about 400 subjects. The results reported here have been selected as illustrating certain points of interest. About 40 subjects, mainly research workers and laboratory technicians, have been studied repeatedly, and it is with these subjects that the effects of vitamin A have been most carefully observed.

Reproducibility of results.—Curves have been recorded twice or oftener in more than 100 subjects, and the reproducibility seems entirely satisfactory. In a few cases, tests have been repeated several times and here too there is little variation (fig. 1). The variations rarely exceed 0·2 log unit for the cone or rod thresholds and 2 minutes for the rod-cone transition time. These variations are similar to those found by Hecht and Mandelbaum (1939).

Course of dark-adaptation: criteria of performance.—Many workers have tried to assess the powers of different individuals to adapt in the dark by methods which will avoid the necessity for determining the whole course of adaptation. In many of these methods, instruments and techniques have been used which measure the extent of adaptation after a few minutes (e.g., Feldman 1937) or even seconds (e.g., Pett 1939) in the dark. Most of these instruments have one fixed illumination, and, after bright-adaptation, the time is measured for the subject just to perceive the illuminated test object. It is assumed that a person whose initial rate of adaptation is rapid is also one whose final threshold is low—in other words, that the course of the whole curve and particularly the final rod threshold can be gauged by a knowledge of the initial rate of adaptation. A study of the complete

course of dark-adaptation, however, shows clearly that this assumption is unwarranted (see also Craik and Vernon 1942, Dow and Steven 1941). Many examples are found where the initial rate of adaptation is rapid but the final threshold quite low. Thus dark-adaptation curves of two or more subjects plotted on one chart often cross, as is shown in figs. 2a and 2b. Such crossing may take place even up to 20 minutes of dark-adaptation. The grading of subjects in order of performance in dark-adaptation after exposure to bright light will therefore vary with the length of time that they have been dark-adapted, and will only remain the same if the time is more than about 20 minutes.

The grading of performance may be especially erroneous if the visual threshold is measured, as in some instruments, after 5–10 minutes in the dark; that is, at a time when the transition between rod and cone vision has occurred or is about to occur. An illustration of this is seen in fig. 2a. Subject 1, with poor dark-adaptation as measured by the final rod threshold, has an early rod-cone transition time. Thus, at 8 minutes, he can see a light of much lower intensity (1 log unit or 1/10) compared with subject 2, although the final rod threshold is much lower in the latter.

These considerations are clearly important, and failure to recognise them has often led to error and misconception in the collation and interpretation of data on dark-adaptation. The best single criterion of dark-adaptation, especially for the detection of vitamin-A deficiency, is the final rod threshold, since, as we shall see later, the administration of the vitamin, if it affects the dark-adaptation at all, will invariably lower the final rod threshold while it may or may not affect other parts of the curve.

Effect of vitamin A.—The most intensive study of the effect of therapy on dark-adaptation has been made on 14 laboratory research workers and technicians who were given either vitamin A (24,000 IU daily) or carotene (20,000 IU daily in the form of carrots) for several weeks. All the results quoted below have however also been seen in other subjects studied less intensively. Dark-adaptation was measured at least twice before the administration of the vitamin or provitamin and was repeated at intervals during the administration; when measurements were made during the period of administration of the vitamin, the treatment was usually stopped for 24 or 26 hours before the test was performed, so that we were not dealing with the possible transient effects of the vitamin (see Yudkin 1941, and below).

The general results have been as follows. Subjects receiving neither vitamin A nor carotene showed no significant change in any part of the curve. About half of the treated subjects similarly showed no significant change. In those in whom significant improvement followed treatment,† there was invariably a lowering of the final rod threshold. Other parts of the curve showed various differences in the manner and extent of the changes. Considering the three features of a dark-adaptation curve—the final cone threshold, the cone-red transition time, and the final rod threshold—and allowing for the fact that the final rod threshold is always one of the features affected by vitamin A, then the four possible variations in the changes which may occur with vitamin A are:

1. Alteration in final rod threshold only.
2. Alteration in final rod threshold and final cone threshold.
3. Alteration in final rod threshold and cone-rod transition time.
4. Alteration in final rod threshold, final cone threshold and cone-rod transition time.

Each one of these types has been observed among our subjects, and representative curves are shown in figs. 3, 4, 5 and 6. The alteration in the cone-rod transition time was often considerable; in one case, it was reduced from 6½ to 2½ minutes; in another, from 9 to 1½ minutes.

So far, we have described only the final changes induced by treatment lasting usually 4–8 weeks. Curves determined at intermediate intervals during this time frequently showed changes intermediate in degree (fig. 7). In one case, the administration of carrots was stopped after 10 days; 7 days later, the subject's ability to adapt had deteriorated towards its original low level (fig. 8).

By measuring the dark-adaptation in another series of subjects at short intervals after a single large dose of the vitamin, some were found who showed improvement in the final rod threshold during the 24 hours after the dose (see also Yudkin 1941). Occasionally, there were indications that the final rod threshold was the part of the curve which changed earliest, and that cone threshold and/or cone-rod transition time improved later. In a few cases, the final rod threshold had partially returned to its previous value by the time the other changes were seen (fig. 9).

† The proportion showing improvement was surprisingly high. In view of the small number of subjects studied, this may have been coincidental but further study is warranted.

DISCUSSION

Considerable differences of opinion have been expressed concerning the technique of measuring dark-adaptation. Discussion has centred especially round the advisability of having a fixation spot, of showing the test light in flashes and of using a form-perception test rather than one of simple light perception. In our opinion many of the differences have been considered too much from the theoretical aspect; too few comparative tests have been done with different apparatus to determine whether and to what extent differences in technique produce different results. Various types of apparatus measure somewhat different functions, and the purpose of any particular investigation should determine the type of apparatus used. Thus, the presence of a fixation spot will be of special value in determining the physiological status of a fairly definite area of the retina; the absence of a fixation spot on the other hand allows the subject to find the most suitable parts of the retina with which to view the object and so to approach the practical conditions of vision at night.

In nutritional work, measurements of dark-adaptation are utilised to detect deficiency of vitamin A. For this purpose, the two requirements of a satisfactory apparatus are that it should give results which, in an untreated subject, are reproducible within fairly narrow limits, and that it should show changes resulting from vitamin-A deficiency. This second point may be demonstrated either by deterioration induced by deprivation of the vitamin or by improvement following treatment with vitamin A. We consider that the results reported here on reproducibility and on changes following administration of vitamin A show that the technique and apparatus we have used meet the requirements for a method suitable for detecting deficiency of vitamin A. Results obtained with the apparatus in nutritional survey work will be recorded in a later paper.

We have already stressed that the determination of dark-adaptation without a fixation spot gives a better idea of the subject's ability to see at low illuminations. Let us then consider our results as they might apply to people going from conditions of high illumination, such as a brightly lit room, into conditions of low illumination, such as a clear star-lit night. It will be evident that individual differences in the course of dark-adaptation will here be of considerable practical importance. After a period of high illumination, two people after a short interval in the dark may have differences in light perception amounting to 10 times (see fig. 2b). These differences, of course, will only be seen if the subjects' cone-rod transition times differ widely. Similarly, the differences will become much less later, after the transition has occurred in both individuals. But until that happens, the differences will be important, especially when it is remembered that the range of variation in the final rod threshold—i.e., the fully adapted eye—in the general population is also of the order of 1 log unit or 10 times (see Robertson and Yudkin 1943).

In effect, these findings mean that the relative ability of people to "see in the dark" may be very different after a short time in the dark from what it is after a longer period. This may account for some of the discrepancies often found between the statement of a person concerning his night vision and his performance as shown by measurement of the sensitivity of his fully adapted eyes. If he is accustomed to spending only a short time in the dark he may well see better than his neighbour, although his adaptation as measured by the final rod threshold may be no better or indeed worse than his neighbour's.

The differences in the effects produced by vitamin A in different people has similar significance. For those engaged in outdoor night work over long periods, such as on sentry duty, the value of the final rod threshold is probably of most importance. But for those who have frequently to leave brightly-lit surroundings to spend short periods in the dark, the speed with which adaptation occurs may be more important. In particular, a shift in the cone-rod transition time of two or three minutes may make a difference of 10-fold or more in their ability to perceive minimal illumination after a short while in the dark.

The fact that administration of vitamin A may or may not affect parts of the dark-adaptation curve other than the final rod threshold is also of practical importance from the point of view of diagnosing deficiency of vitamin A. Very different interpretations of the effect of dosing with vitamin A may sometimes be made if single measurements are recorded at different intervals during the course of the adaptation. Thus, measurement of dark-adaptation in the first 12 minutes (see fig. 3) may not reveal the improvement produced by the vitamin. The conflicting reports on the effect of vitamin A may possibly be due to such causes. Our results indicate that if a reading is to be taken at only one point in the curve to ascertain whether the vitamin has altered dark-adaptation, this point should be after complete, or nearly complete, adaptation—i.e., as near as practicable to the final rod threshold.

Let us now consider the theoretical aspects of the changes induced in the course of adaptation by vitamin A. We have stressed the fact that treatment with the vitamin may or may not change the cone-rod transition time. Hecht and Mandelbaum (1939) have also commented on similar differences found in different types of deficiency and conclude that "simple dietary avitaminosis does not change the time of the cone-rod transition period, whereas severe cirrhosis of the liver delays its appearance to almost twice the time, even though the final thresholds may be affected to the same extent in the two instances" (see also Haig, Hecht and Patek 1938). They conclude that the change in the transition time points to disturbance in the metabolism of the vitamin. Superficially, our results appear to contradict those of the American workers. All our subjects who responded to vitamin A may presumably be classed as showing dietary deficiency rather than metabolic disturbance, since they were all apparently healthy, yet a change in transition time was found in some and not in others. Our different results may, however, be explained by the differences in the technique of measuring the dark-adaptation. Hecht and his collaborators used an apparatus which is provided with a fixation point, and it may be that, in the small and localised retinal area they tested, deficiency of vitamin A produces different effects according to whether the deficiency is dietetic or metabolic. These different effects may not be equally apparent in all parts of the retina, so that an apparatus such as ours, which encourages the use at any moment of the most sensitive part of the retina, may not show them even if they exist. This question is now being investigated by measuring dark-adaptation with and without a fixation point in the same subjects.

SUMMARY

Using a modification of the Crookes dark-adaptation apparatus, we have measured the course of dark-adaptation in some 400 apparently normal subjects.

Repeated measurements showed that the readings for one subject are reproducible within narrow limits. In any one individual, the variations rarely exceed 0·2 log unit for cone or rod threshold and 2 minutes for the cone-rod transition time.

The course of adaptation varies considerably in different individuals and the visual threshold in the early stages of adaptation—especially in the first 10 minutes—may bear no relation to the readings of the final rod threshold. This confirms the observations of other investigators, but, since many workers still use methods which give readings within a few minutes or even seconds of the onset of dark-adaptation, the importance of these observations is stressed.

Administration of vitamin A, if it affects dark-adaptation at all, always affects the final rod threshold. Other parts of the curve, such as the cone threshold or the cone-rod transition time, may not be affected.

If single readings are to be used for assessing visual performance in the dark they are best made in conditions approaching complete adaptation.

We are indebted to Dr. K. J. W. Craik for much helpful discussion throughout this work and to Dr. L. J. Harris for his interest and advice. Our thanks are also due to Messrs. Glaxo, Ltd., for supplies of vitamin A.

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LUNG STONE CAUSING PROFUSE AND RECURRENT HÆMOPTYSIS

F. G. CHANDLER, M D CAMB, F R C P*

PHYSICIAN TO ST. BARTHOLOMEW'S HOSPITAL, LONDON; SENIOR PHYSICIAN TO THE LONDON CHEST HOSPITAL

IN July, 1931, a doctor asked me to see a woman, aged 35, because of profuse hæmoptysis. The history was one of recurrent hæmorrhages from the lung since the age of 14. At that age she was reputed to have had pneumonia on the right side, and ever since she had been troubled by a cough every day of her life, and at intervals by the hæmorrhages already mentioned. The hæmorrhages were preceded by a pain in the lower part of the right chest. These occurred once or twice a year, but as she grew older they became more frequent and severe, and were liable to come on after exertion. She was married at the age of 25, after which there was no further bleeding from the lungs for five years, but the cough continued the whole time. At the age of 30 she had another hæmoptysis after cranking a car, and afterwards the hæmoptyses became worse with exercise and continued at approximately yearly intervals.

There had been no loss of weight, and she felt perfectly well apart from the distress caused by the hæmoptyses. On examination there was dullness over the right lower lobe, and râles were present. She had been examined and X rayed before. No satisfactory explanation of the recurrent hæmoptyses was forthcoming. I made a diagnosis of bronchiectasis, in which I felt considerable confidence; and the relatives of the patient were much gratified that at last someone had really got to the root of the trouble. The advice I gave was that when the hæmorrhage had completely ceased the bronchial tree should be investigated by lipiodol. Five days later the patient suddenly felt sick, had a paroxysm of coughing, and coughed up an irregular, hard, jagged object 0·75 by 0·5 cm. in size, apparently a lung stone. Immediately after this there was a profuse hæmorrhage. Her doctor reported the right base solid, but this soon began to clear. For three or four days the patient brought up a considerable quantity of blood. Then it gradually ceased. After this the cough, which had been with her daily for twenty years, ceased and did not recur, and there was no more hæmorrhage. In spite of this I thought that bronchiectasis probably existed and that a lipiodol investigation was highly desirable. This was carried out in the September. No dilatation of the bronchi was seen, proving that the hæmorrhage was not due to bronchiectasis; from the previous and subsequent history it was almost certainly caused by the lung stone, which was presumably half in and half out of the bronchus, causing both the hæmorrhages and the persistent cough.

In 1934 she had one slight hæmorrhage. In November, 1939, I saw her again. She had been remarkably well but on three occasions, after heavy exertion, had brought up less than a teaspoonful of blood. Since June 1939, however, she had had a recurrence of pain at the right base which might be acute for a minute or two or an hour. She described it as like the old hæmorrhage pain. On this occasion she looked well with no loss of weight,

* Dr. Chandler died on Oct. 8, 1942. This article was among his papers.

no cough, no sputum, and no hæmorrhage for two years. There were no abnormal physical signs in the chest, no clubbing of the fingers, and the blood-pressure was normal. In 1940 she contracted pneumonia on the left side. This was followed by an empyema which was successfully drained. The patient made an excellent recovery, she is well today, and there have been no more hæmorrhages. While in hospital for the drainage of the empyema she had a coughing and vomiting attack and brought up a stone, similar to the previous one, but smaller.

COLLAPSE UNDER PENTOTHAL SODIUM ANÆSTHESIA

F. HOENIGSBERGER, L R C P, D A
ANÆSTHETIST TO THE SCOTTISH EMS

IN Hunter's[1] summary of the dangers of 'Pentothal Sodium' anæsthesia there is a reference to experimental work showing that cardiac arrest may follow the injection of this drug into dogs. I feel that this must be a rare complication in man and I know of no cases of this kind having been recorded. Since I have used this drug for some years in a considerable number of cases, and met this complication for the first and only time about six months ago, I hope it may be of interest to record this case.

A miner, aged 40, of spare build, was admitted in the early hours of the morning with a compound fracture of the tibia and fibula and, in addition, a fracture of the neck of the femur, which were due to a mining accident. There was no great degree of shock. He had had morphine, gr. ¼, 3½ hours before operation, and hyoscine, gr. 1/150, was given 1½ hours before.

A smooth induction was obtained with 3 c.cm. of a 5% solution of pentothal sodium. After a short pause, a further 5 c.cm. of the same solution was injected more slowly and it was found that narcosis was still fairly light, the respiratory excursions being good. A further 4 c.cm. was injected slowly after a short interval, while the operation was being begun. At this stage, 10 minutes after the start of the injection, pallor appeared suddenly and respiration ceased abruptly. The pulse was found to be very weak, fast and irregular in time. Artificial respiration with pure oxygen by means of a rebreathing bag was started without delay and satisfactory chest expansion was obtained through an oral airway. The pupils were contracted at this stage. After 3 minutes there was no spontaneous attempt at respiration and the pulse became barely perceptible. An intravenous injection of 6 c.cm. of nikethamide was now given without apparent effect. Five minutes after the appearance of the first alarming signs, the pulse was quite imperceptible and no heart sounds were audible to auscultation. Pallor without cyanosis persisted and the pupils were now dilated.

At this stage 1 c.cm. of 1:1000 adrenaline was injected by the surgeon through the fourth left intercostal space, as near to the border of the sternum as possible. This produced no apparent effect except for a few generalised muscular twitchings. After an interval of one minute, a similar injection was given through the third left intercostal space, which, preceded by a few powerful generalised muscular contractions, was followed at once by reappearance of the radial pulse and heart sounds to auscultation (7 minutes after the first appearance of untoward signs). The pulse was irregular but quite strong and was accompanied by the appearance of a pink colour in the patient's face. Spontaneous respiration restarted at the same time, until which time effective artificial respiration had been continued without interruption. The operation was then resumed and completed in a further 40 minutes, during which time pure oxygen was administered continuously. There was no further cause for alarm.

Progress.—The pulse continued to be irregular but strong for the rest of the day, but settled satisfactorily in the evening. The patient regained consciousness 1½ hours after return to the ward, but slept for long periods during the day. I questioned him in the evening and he appeared perfectly rational, and throughout his stay in hospital showed no signs of any cerebral damage. Two days after operation he developed pericarditis and bilateral basal pleurisy and these conditions did not completely clear up until about three weeks later. In the meantime, he developed a dry gangrene of the leg which had been the site of the compound fracture. This leg was amputated above the knee 24 days after the first operation. On this occasion a unilateral subarachnoid leg-block was employed, accomplished by 110 mg. of a 10% solution of procaine, with a premedication of morphine, gr. 1/6, and hyoscine gr. 1/150, 1½ hours before operation. There was no appreciable fall of blood-pressure and the patient remained in an excellent condition throughout and after the operation. Dissection of the amputated leg revealed a thrombosis of the posterior tibial artery in its entire length.

On questioning, the patient gave a history of having "collapsed" under a previous anæsthetic, but he could give no particulars. Examination of the heart after his recovery was complete showed no abnormalities, but an electrocardiogram could not be taken. He is a spare man with a pale complexion, but he shows no signs of nervousness or excitability. He professes always to have been well and fit.

I wish to thank Dr. W. J. Richard and Mr. A. M. Clark for permission to publish this case.

1. **Hunter**, A. R. *Lancet*, 1943, i, 46.

Medical Societies

BRITISH ORTHOPÆDIC ASSOCIATION

THE spring meeting of the association was held in Glasgow on May 14 and 15 under the presidency of Mr. G. R. GIRDLESTONE.

INJURIES OF THE SPINAL CORD

Mr. R. C. MURRAY, in an analysis of 21 cases of spinal-cord injury admitted to the Killearn EMS Hospital, said that the neurological lesion can usually be accounted for by a study of the radiograms, but where these show no adequate cause there may be a protrusion of bone from the back of the vertebral body which is a possible indication for early laminectomy. In cord lesions with complete loss of function lasting 24 hours no recovery can be expected in segments below the lesion. The chance of recovery is best in cervical lesions and those below the first lumbar vertebra. There is no limit to the time of recovery of motor-fibres in the roots and cauda equina. Reduction should be carried out in all cases, for even in complete cord lesions this may lead to the recovery of some roots and so add two or even three useful segments. Reduction should be followed by fixation—in the cervical region by continuous skeletal traction, after operative reduction by a hyperextension plaster jacket, and in cauda lesions by a plaster bed and turning case. The greatest difficulty, on account of pressure sores, is in dorsal lesions, for which a complete combined plaster jacket and double spica is advisable, so as to distribute pressure evenly, facilitate turning and relieve pain and spasm. For treatment of the bladder, Mr. Murray recommended tidal drainage. Few cases should be regarded as hopeless, for even with a complete lesion at the level of the conus a patient may learn to walk.

Mr. ROLAND BARNES, reporting on a similar group of patients, stressed the importance of accurate sensory testing in assessing the degree and prognosis of the spinal-cord injury; this is more valuable than knowledge of the extent of motor paralysis. The prognosis is worse in lesions at the level of the 12th thoracic than of the 1st lumbar vertebra. Laminectomy is never indicated as an immediate operation, but should be done when there is an incomplete paraplegia not showing spontaneous recovery, if there is evidence of increasing pressure on the cord, or for severe and intractable root pains. Reduction of vertebral displacement should always be attempted particularly if the paraplegia is incomplete. Radiograms of the highest quality are essential. Fracture-dislocations with locked facets are commoner than is generally realised. For this injury an open operation is required; the excision of articular processes should be avoided so as to maintain the stability of reduction which usually should be further assured by internal fixation. For such operative cases Mr. Barnes prefers a plaster bed and turning case. For paralysed bladder he condemned manual expression or an indwelling catheter; suprapubic cystotomy is indicated under field conditions, in irreparable spinal-cord injuries above the sacral segments, or where for any reason tidal drainage is impracticable.

PHOSPHATASE IN DISEASES OF BONE

Prof. NOAH MORRIS reviewed present knowledge of phosphatase, an enzyme which is widely distributed in the tissues and whose function is to accelerate the conversion of organic into inorganic phosphate. If jaundice is excluded, increase of plasma alkaline phosphatase is pathognomonic of the presence of bone disorder. Of itself it is of little value in the differential diagnosis of osseous lesions, but taken in conjunction with clinical, radiological and other biochemical findings it is often of considerable assistance. Destruction of bone per se is not accompanied by any great increase of plasma phosphatase unless new bone or osteoid tissue is being formed. In the healthy person the plasma phosphatase increases during periods of growth. Acceleration in rate of growth is associated with increased activity of osteoblasts. The factors regulating osteoblastic activity almost certainly include the rate of deposition of calcium salts. A reasonable hypothesis might be that, if ossification is not maintained at a rate sufficient to meet the degree of cellular activity on which phosphatase formation is dependent, excess of ferment passes over into the plasma. If this is correct one might expect an increase of plasma phosphatase as a result of (*a*) increase in bone-cell activity at such a rate that it could not be satisfied by the available calcium, or (*b*) insufficient intake of calcium or vitamin D or both. With Mr. Matthew White he had followed the course of the plasma phosphatase in a child with healed rickets during a period of calcium starvation and ammonium chloride administration. Here with the defective supply of calcium the plasma phosphatase showed a considerable rise. Woodard and his co-workers showed that with primary tumours plasma phosphatase increased only when the tumour cells are producing phosphatase much quicker than normal bone does, and that a fall of plasma phosphatase after surgical removal or irradiation therapy is due to the withdrawal or inactivation of the phosphatase-forming cells. In bone metastases the increase of plasma phosphatase appears to be due to a defence reaction manifest as increased bone formation adjacent to the tumour cells. Only when the reaction is osteoplastic does the serum phosphatase increase; in osteolytic lesions little alteration is observed. In many pathological conditions of bone, such as rickets, osteomalacia and Paget's disease, the variations of plasma phosphatase afford a valuable guide to the course of the disease, the prognosis and the effect of any therapeutic measure. Acid-phosphatase is found in many tissues, but if an increase is found in the plasma it is almost invariably derived from prostatic glandular epithelium. Normally very little prostatic phosphatase appears in the plasma and it is abnormally high only when the blood and lymph vessels are invaded by tumour cells derived from the prostate. Serial determinations of plasma acid phosphatase seem to be of special value in assessing the results of castration or œstrogen therapy.

* * *

In a paper on *The Control of Infection in Burns*, Dr. LEONARD COLEBROOK divided the infections into two categories—first, the coccal infections of the first week which are the most threatening to life and to rapid recovery but the control of which is well within sight; secondly, the bacillary infections occurring when sloughs are separating and largely responsible for the patient's anæmia and low state. The control of these may be expected only when much more trouble is taken in the prevention of hospital infection, especially from dust, and when a chemotherapeutic agent is available which is as effective against them as penicillin is against the cocci. In 310 cases of burns admitted to the special unit of the Royal Infirmary, Glasgow, the methods used to obtain improved results included strict aseptic precautions during the first few hours following admission, with the use of sterilised blankets; an attempt to sterilise the burned surface with CTAB solution (without anæsthesia); the application of a bacteriostatic dressing which could be left undisturbed for 7–10 days (sulphanilamide or sulphathiazole, in lanette wax SX and castor oil base—10% for most cases, 3% for extensive burns); prompt elimination of hæmolytic streptococci from burns already infected, by means of penicillin or propamidine; and reduction of cross-infection—e.g., strict "no-touch" dressing technique, masks, and elimination of dust.

Mr. JAMES PATRICK, in a paper on *Supination and Pronation in Forearm Fractures*, said that when a fracture of the forearm bones has been well reduced limitation of movement is only to be feared in severe fractures of the head of the radius and in fractures lower down in either bone where the attachment of the interosseous membrane is involved by fibrosis, ossification or shortening. It is important to realise that the axis of radial rotation is exactly along the interosseous ridge of the ulna. He stressed the importance of lesions of the triangular fibrocartilage at the inferior radio-ulnar joint, not only in Colles fracture but also in fractures of the head of the radius, where early active rotation movements are advisable after the head has been excised. In fractures of the shafts of the radius and ulna operation should be avoided as far as possible; where necessary only the radius should be exposed and its interosseous aspect should not be encroached on. When cross union occurs in the lower third of the forearm, excision of a segment of the ulna including the fracture gives good results. For permanently severe loss of rotation after Colles fracture, excision of the lower inch and the articular portion of the ulna is also good. Late angulation of fractures of both forearm bones is due to wasting of the brachioradialis muscle which allows sagging of the fracture within the plaster case; adequate support in the middle of the forearm avoids this complication.

Mr. I. S. SMILLIE, in a paper on *Regeneration of the Menisci of the Knee-joint* in man, described the fibrous structure which partially replaces an excised meniscus. It is densely adherent to the synovial membrane at its periphery, it is thinner and narrower than the normal structure and is whiter because it is composed of fibrous tissue only. In five cases regenerated "cartilages" were torn, a circumstance which is rare unless factors producing gross instability are present within the joint.

Dr. G. W. ARMSTRONG, of the Canadian Orthopædic Unit, with a cinematograph film, described his method of internal fixation by screws in carefully selected cases of *Oblique Fractures of the Tibia*, demonstrating the importance of a precise technique with perfect equipment. Mr. ATHOL PARKES read a paper on *Traumatic Ischæmia of Peripheral Nerves* occurring in a group of patients in whom a severe injury to the leg, with or without fracture, had been followed by gross swelling of the limb and anæsthesia of gradual onset spreading centripetally from the great toe over the foot and ankle. Later, objectively, paralysis with the reaction of regeneration was observed in all the intrinsic muscles of the foot, with sensory loss in the distribution of all the deep nerves. Recovery is very slow. The cause of the condition may be tension under the deep fascia due to extravasation of blood and tissue fluids, causing ischæmia of the nerve trunks by pressure. Early operation is required even when the peripheral pulse is present. Incisions through the deep fascia will relieve tension and prevent the development of an extremely disabling condition.

Clinical demonstrations were given at the Glasgow Royal Infirmary and the Phillipshill Orthopædic Hospital. At Phillipshill Dr. A. K. BOWMAN, introduced by Mr. JAMES RUSSELL, described the influence of Glasgow in the development of orthopædics, particularly in relation to the work of the Hunters, of Lister and of Macewen.

EXTENSION OF AUXILIARY RAMC FUNDS.—Lieut.-General Sir Alexander Hood, director-general of Army Medical Services, presided at a meeting on June 17, when an extension of the funds to meet the needs of cases arising from the disablement or death of medical and dental officers serving during the present war was initiated. The funds were founded in 1916 for the benefit of widows, orphans or children of officers and men killed or severely disabled while serving with one of the auxiliary branches of the RAMC—namely, Special Reserve, Territorial or New Army. The extended funds grant financial help to officers of the auxiliary branches of the RAMC and the Army Dental Corps who become incapacitated, wholly or in part as a result of wounds, sickness or accident arising during service in the present war, and to their widows and children. The minimal subscription has been fixed at one guinea, and it is hoped that subscribers will make their first subscriptions retrospective. Cheques should be sent to the treasurer of the Auxiliary RAMC Funds (1939), 11, Chandos Street, London, W.1.

Reviews of Books

Year Book of Eye, Ear, Nose, Throat, 1942

SAMUEL J. CROWE, MD; ELMER W. HAGENS, MD; LOUIS BOTHMAN, MD. (Year Book Publishers; Lewis. Pp. 640. 11*s*.)

THE field scanned in this book is roughly the year from the middle of 1941, and for only a part of this was the United States an active participator in the war; as a result about 90% of the references are to American literature. Neither of the specialties has much direct warlike contact, and it is natural therefore that where speculative inquiry has been exercised there is an immediate practical application to some problem provoked by the war. The importance of keen vision in mechanised warfare, both on the ground and in the air, coupled with nutritional difficulties, has resulted in a survey of the relationship of the vitamins to ophthalmology—an excellent special article referring to 99 papers. There are again a number of references to papers on the effects of noise on hearing. Perlman produces evidence showing that deafness is maximal an octave above the pitch of the noise of greatest intensity. Experimental work on cochlear potentials and action currents in single fibres of the auditory nerve confirms that spread is towards the high tone end of the organ of Corti as the intensity of the stimulating noise increases. The best treatment of aero-otitis is decompression in the pressure chamber (or re-ascent in the aircraft) to the level at which the eustachian tube block occurred, followed by gradual descent to ground level, while the patient swallows frequently. Ventilation of the middle ear must be performed with a gaseous mixture roughly in equilibrium with the partial pressures exerted by the gases in the circulating capillary blood. Thus, if at high altitude pure oxygen is breathed, it must be replaced in the middle ear by normal atmospheric air as soon as possible, or the excess oxygen will be absorbed, and a serous exudate will form, especially if the airman is asleep and the eustachian tube remains closed.

It is not yet clear that the surgical treatment of otosclerosis is successful even in selected cases. Preservation of the fistula is difficult and failure common. It must also be remembered that the pathology of the disease involves atrophy of nerve-fibres. More evidence is accumulating to show that the prompt exhibition of sulphonamide drugs in full doses helps the resolution of acute otitis media and is materially lessening the incidence, not only of mastoiditis and its complications, but even of the need for myringotomy. A little more information is given of the action of penicillin, and the editor is certain that it has a selective effect upon staphylococcal infections.

Pressman's cinematographic study of vocal cord movements is perhaps the most original work mentioned. The cords act in the production of pitch and intensity not merely by increase or decrease in tension, but also by vibrating in segments. The posterior portions of the cords progressively meet, leaving smaller and smaller lengths of the anterior ends to form the glottic chink. Laryngeal tuberculosis is declining in incidence, and an account is given of 500 cases divided into hæmatogenous and bronchogenic types, of which the former is not usually associated with pulmonary signs, but is often combined with ulceration of the pharynx and other portions of the upper alimentary tract, and is on the whole of worse prognosis. There is no new material on the treatment of neoplasms.

Constitution and Disease

JULIUS BAUER, MD, professor of clinical medicine, College of Medical Evangelists, Los Angeles, California; formerly professor of medicine, University of Vienna. (Heinemann. Pp. 208. 21*s*.)

MOST diseases are neither purely environmentally nor purely constitutionally determined, but depend on factors of both kinds. It has been shown that peptic ulcer is five times, and carcinoma of the stomach four times, as common in the families of peptic-ulcer patients as in those of patients suffering from other diseases. Professor Bauer illustrates his discussion of the clinical application of such observations with abbreviated case-histories, drawn from a clinical experience which must have been as full of insight as it is wide. In a way that is more anecdotal than systematic in style, and yet convincing, he discusses the manifestation of the hereditary constitution in a generalised bodily habitus, and in inferiorities of certain tissues, systems or organs; and the significance of individual peculiarities of the integrative systems, endocrine and nervous. He lays great weight on the importance of a psychotherapeutic attitude in the handling of ordinary organic disorders. He cites the case of a young man who had to have both testicles removed for tuberculosis; the surgeon inserted a dummy, and led his patient to believe that only one testis had been extirpated. Despite the development of a complete eunuchoidism, the patient was encouraged to lead a normal sexual life up to his death of miliary tuberculosis in advanced middle-age. He strongly recommends the sensible use of placebos, and believes that many drugs with known physiological effects more commonly benefit the patient through suggestion than through their specific action. Medical tradition discourages the doctor from prescribing drugs in this way unless he can take in himself as well as his patient with his own hocus-pocus. Bauer criticises the attitude by which medicine is turned from an art into a sort of super-science, so that the individuality of the patient is lost behind X-ray films and laboratory reports.

Solving School Health Problems

DOROTHY B. NYSWANDER, PhD. (Oxford University Press. Pp. 377. 11*s*. 6*d*.)

IN the United States, as in this country, dissatisfaction with the efficiency of the school medical service has been felt for some time and researches, of which this book describes one, have been undertaken to find the cause and to suggest remedies. The story opens with an account which might apply to many places in this country of physicians carrying out stereotyped inspections without any imaginative backing, of medical records gone astray, and of the many other difficulties familiar to all in this field of medicine. This is followed by an evaluation of the work of the various participants in the service carried out with meticulous accuracy that involved, for example, the timing of a nurse in all her activities throughout her working day by means of a stop-watch. Then come special chapters on the filing and compilation of school medical records, the approach to special defects, and the reactions of private practitioners to the school health service. As a result of all this, reforms were introduced which—the last chapter of the book implies—had a considerable effect in raising the standards of the service. These suggestions must be studied in their own context and judged in relation to conditions in America.

The study undoubtedly had a rejuvenating effect, first on the medical services of the health district in which it was carried out, and ultimately on all the schools of New York in general. But it is possible that these improvements were the result, not of the innovations recommended, but of the fact that at last somebody was showing some interest in the work of the school medical service. Morale is not really to be measured by stop-watches or improved by modifying the layout of a record card. The book is not one which will have a wide circulation because its appeal is limited to a comparatively small section of the profession. But it is undoubtedly stimulating and has arrived opportunely when reforms are in the air.

Bradley's Topographical Anatomy of the Dog

(4th ed.) Revised by T. GRAHAME, FRCVS. (Oliver and Boyd. Pp. 316. 28*s*.)

THE fourth edition of this well-known work has been improved by the addition of some newly discovered facts and by X-ray photographs and fresh diagrams. It is now comparable in scope, method of presentation and in its excellent coloured diagrams with the best of the standard textbooks of human anatomy. It also includes much detailed instruction for dissection and should be of value as a work of reference to teachers and students of comparative anatomy and veterinary science.

ROYAL EYE HOSPITAL, LONDON.—Meetings of the Clinical Society of this hospital have been resumed, and at 4.30 PM on Friday, July 16, Dr. R. D. Lawrence will give a lecture on diabetes and eye diseases. Anyone interested will be welcome.

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THE LANCET

LONDON: SATURDAY, JULY 3, 1943

MENINGOCOCCAL INFECTIONS

THE meningococcus was isolated by Weichselbaum, in 1887, from a case of cerebrospinal fever, and until lately a large proportion of the medical profession looked on it solely as a cause of meningitis; even today the other manifestations of meningococcal infection are sometimes forgotten. Yet GWYN[1] grew this organism from the blood-stream and knee-joint fluid in a case of meningitis in 1899, and the existence of a chronic meningococcal septicæmia, not necessarily associated with meningitis, was demonstrated soon afterwards. The chronic septicæmia achieved some recognition in 1914–18, and during the present war it has become more widely familiar. The clinical picture is fairly characteristic—acute onset of illness with fever, which may be of various types, general symptoms of infection, localised joint and muscle pains, usually a leucocytosis, and a rash, consisting usually of crops of circular pink spots, ranging in diameter from about 5 mm. upwards, often tender and often having a purpuric centre in the bigger spots. The meningococcus can be obtained by blood-culture in many cases, though repeated attempts are commonly needed. This illness is likely to be diagnosed initially as influenza or rheumatism, or sometimes as erythema nodosum, and if not recognised and treated with sulphonamides may persist for months, and may end with a spread to the meninges, though the cerebrospinal fluid in the chronic stage may be absolutely normal. Many cases of meningococcal meningitis give a history indicating a preliminary septicæmic phase, but as a rule this is quickly over.

In sharp contrast to this chronic illness is the fulminating meningococcal septicæmia in which a patient is taken ill and dies within a few hours. This fulminating form appears in various guises: there is sudden fever, with a very rapid deterioration in the general condition and a rash which is usually petechial with some larger purpuric elements; the blood-pressure may be normal or fall dramatically; the mental condition may vary from alertness to delirium or persistent deep coma. The relation between symptoms and pathological processes has been made much clearer by BANKS and MCCARTNEY.[2] In 1942 they showed that parenchymatous changes in the central nervous system, in addition to the meningeal infection, were much commoner than generally realised, not only in the fulminating forms but also in acute meningitis. These changes consist in congestion and œdema, with capillary thrombosis, followed later by inflammatory polymorph cuffing around the vessels of various parts of the central nervous system; the condition may be generalised or focal. Clinically the symptoms of acute meningitis are complicated by those of encephalitis, especially continued deep coma, cyanosis and stertorous or irregular breathing. These cases usually end fatally without recovery of consciousness, notwithstanding the use of chemotherapy. It was suggested that the encephalitic changes are largely toxic, due to an overwhelming initial toxæmia through massive infection, and that these toxic changes lead to the fatal result, even when chemotherapy has successfuly cleared up the infection. BANKS and MCCARTNEY did record one case which recovered, where there was evidence of encephalitis in the development of temporary parkinsonism after recovery from the acute stage. Some of the cases they described also showed hæmorrhage or thrombosis in the adrenals, and the adrenal changes have been discussed in greater detail in their recent paper.

The association of a fulminating septicæmia with bilateral adrenal hæmorrhage and circulatory failure has become popularly known as the Waterhouse-Friderichsen syndrome, but BANKS and MCCARTNEY point out that there is no valid reason for the retention of this eponym. From the pathological standpoint the adrenal lesions are varied in character, pure hæmorrhage (hitherto by far the best recognised), thrombotic necrosis with peripheral hæmorrhage, gross œdema without hæmorrhage but with areas of polymorph infiltration, and combinations of these lesions being represented. In the cases they describe these lesions were all extensive, and involved the medulla and adjacent parts of the cortex; sometimes the remaining cortical cells were definitely disarranged by the pressure. It seems probable that if careful histological examinations of the adrenals were made as a routine similar changes would more commonly be found. MITCHELL and ANGRIST[3] described 18 cases where focal necrotic changes were found in the adrenal cortex in the course of routine post-mortem histological examinations in a series of patients dying from various, usually infective, conditions. From the 11 cases which BANKS and MCCARTNEY describe, 8 of which were studied at autopsy and 3 of which recovered, they differentiate two different clinical adrenal syndromes—the pure adrenal syndrome and the mixed or encephalitic adrenal syndrome. The two have in common the sudden onset with fulminating septicæmia and purpura, with very low blood-pressure, imperceptible pulse and collapse, and usually cyanosis; but in the pure adrenal syndrome the mental condition usually remains clear to the end, whereas in the mixed syndrome there is early coma which persists. In the former, respiration is either normal or there is dyspnœa of the air-hunger type, whereas in the latter there is rapid stertorous breathing, finally of the Cheyne-Stokes variety. Three cases, assumed from the symptomatology to be of the pure variety, recovered under active therapy with sulphathiazole, together with replacement therapy by repeated administration of cortical extract and desoxycorticosterone acetate over the critical period. Last week, MORISON described autopsy findings in 3 children, one of whom was brought to hospital dead, the others dying within an hour of admission. In all 3 there was extensive hæmorrhage into the adrenals, and though the causative organism could not be identified the probability seems in favour of the meningococcus. MORISON questions the accepted belief that the circulatory failure is due primarily to the adrenal lesion, and suggests that the peripheral

1. Gwyn, N. B. *Bull. Johns Hopk. Hosp.* 1899, **10**, 112.
2. Banks, H. S. and McCartney, J. E. *Lancet*, 1942, i, 210; *Ibid*, June 19, 1943, p. 771.
3. Mitchell, N. and Angrist, A. *Amer. J. med. Sci.* 1943, **205**, 549.

vascular upsets may be of first-rate importance, the adrenal changes being merely contributory to the usually fatal outcome; it is well known that adrenalectomised animals withstand shock badly. On these grounds he urges the importance of energetic attempts to restore normal vascular conditions by the administration of plasma as well as adrenal substitution, which he relegates to second place. The use of plasma or blood in addition to cortical therapy was also recommended by GRACE, HARRISON and DAVIE,[4] who recorded a success with this treatment.

Two lessons are to be learned from this work. First, meningococcal infection is often, or even usually, septicæmic, and meningitis is only one manifestation of infection. Secondly, impending adrenal and vascular failure must be looked out for in meningococcal (and other) infections, and combated actively when it occurs; the prognosis in cases with sudden adrenal failure is grave but not hopeless.

MECHANISM OF BLOOD CLOTTING

FORTY years ago MORAWITZ propounded the theory that blood-clotting is a two-stage mechanism: in the first stage the prothrombin of blood-plasma in the presence of calcium ions and a tissue or platelet factor (thrombokinase, thromboplastin) is transformed into thrombin; in the second stage the thrombin acts on the plasma-protein fibrinogen, converting it to the relatively insoluble fibrin which forms the scaffold of the clot. The framework of this theory is now generally accepted, but there is still much controversy about the detail. Useful information has been obtained from studying the blood-clotting activity of certain proteolytic enzymes, and by following the kinetics of the reactions. EAGLE[5] showed that trypsin and certain proteolytic snake-venoms in proper concentration "activated" prothrombin to thrombin, and in this reaction calcium was not necessary. The concentration of trypsin had to be optimal; if it was too weak there was no action at all; if it was too strong both prothrombin and thrombin were destroyed. He compared the rates at which thrombin was formed from prothrombin by calcium-platelet mixture, crystalline trypsin, and the snake-venoms; very similar curves were obtained. He therefore suggested that the normal action of the calcium-platelet combination was to form an enzyme that converted prothrombin to thrombin; much as the trypsinogen of the pancreatic secretion is converted by the enterokinase of the intestinal secretion into the actively proteolytic trypsin.

In the early days of blood-coagulation studies, SCHMIDT suggested that thrombin was a proteolytic enzyme acting on fibrinogen; though not accepted by many, this has remained a possibility, and here again study of the action of known proteolytic enzymes has brought support. EAGLE has shown that some snake-venoms clot blood by acting directly on fibrinogen and converting it to fibrin; they are active in very high dilutions, their power varies as their proteolytic activity (estimated by their action on gelatin), and their optimum pH is the same as that of thrombin; the proteolytic enzyme papain shows similar properties. EAGLE therefore looks on blood-clotting as the outcome of the reaction of two proteolytic enzymes:

(1) Inactive prothrombin + activating proteolytic enzyme → active proteolytic enzyme thrombin.

(2) Fibrinogen + thrombin → fibrin.

The system whereby the precursor of a proteolytic enzyme is activated by a second proteolytic enzyme has already been found by KUNITZ and NORTHROP[6] in the activation of chymotrypsinogen by trypsin, and the blood-clotting system appears to be similar.

All this left unanswered two interlocking problems: Why does the blood not clot in vivo, and how is reaction (1) set off? HOWELL'S theory was that circulating heparin acted as an anti-prothrombin and thus prevented blood from clotting in vivo, but when blood was shed a neutralising thromboplastin formed by disintegrating platelets had to be postulated. EAGLE also allows that it remains doubtful how the platelets and calcium ions are induced to form the activating enzyme only when blood is shed. FERGUSON[7] now suggests an explanation for some of the difficulties. He thinks that the activating proteolytic enzyme is to be found in the non-specific proteases that can be demonstrated in tissue, blood-cells and serum, those with a trypsin-like action—tryptases—being important. Under certain conditions this enzyme can also digest prothrombin and thrombin—thus explaining the variable anti-thrombic activity of serum—and can digest fibrinogen and fibrin causing "fibrinolysis." Normally the enzyme is inactive; "damage," he says, "i.e. colloidal disturbance, introduces new conditions favourable to activation of the enzyme." When it is free, the tryptase in conjunction with ionised calcium and free phospholipid acts as the agent for conversion of prothrombin to thrombin. FERGUSON points out that tryptase-inhibitors exist in normal plasma and serum, and there is evidence that they are chemically similar to heparin, but similar inhibition can be produced by several other substances. These tryptase-inhibitors are thought to be present in sufficient concentration to prevent in-vivo coagulation.

The main differences between the two theories are as follows. EAGLE believes that the first link in the chain is formed when blood is shed by combination of disintegrating platelets and calcium; he assigns no place to heparin or phospholipid (cephalin), accepting the evidence that these are unnecessary and their importance unproven. FERGUSON believes that the initial enzyme is the normal tryptase present in the blood in an inactive form; it is activated when blood is shed by cephalin and calcium, but he does not know precisely how; since cephalin and calcium are present in the blood, some tryptase may be activated in vivo and is kept in check by natural anti-tryptases of which heparin may be a type. FERGUSON asserts that serum-tryptase variations account for difficulties in the preparation of plasma products; but others might retort, and quote figures in support, that platelet disintegration is responsible. While the crux of blood-clotting—the means whereby the chain of events is set in train when the blood is shed—remains unsolved, FERGUSON'S claim to a comprehensive hypothesis seems premature. But the physician will gather that the names he has learnt to

4. Grace, W. H., Harrison, C. V. and Davie, T. B. *Lancet*, 1940, ii, 102.
5. Eagle, H. *Medicine, Baltimore*, 1937, **16**, 95; *J. exp. Med.* 1937, **65**, 613; Eagle, H. and Harris, T. N. *J. gen. Physiol.* 1937, **20**, 543.
6. Kunitz, M. and Northrop, J. H. *J. gen. Physiol.* 1935, **18**, 433.
7. Ferguson, J. H. *Science*, 1943, **97**, 319.

associate with the twofold reaction of blood-clotting conceal a system of enzyme and activator such as he has met with elsewhere in physiology.

TOPOGRAPHY OF DIPHTHERIA BACILLI

A tellurite-containing medium has many advantages over the Loeffler slope in the investigation of diphtheria. Besides improving bacteriological diagnosis (the Loeffler slope misses 10–30% of clinical infections), the newer medium eliminates false positive reports on cultures from nose, ear or wound, it facilitates the detection of carriers, and by type-determination it obviates the need for virulence tests in a large proportion of cases since practically all gravis and intermedius strains are toxigenic. Type-determination also helps towards a better understanding of the epidemiology of diphtheria and explains why the fatality is low in one area and high in another, according to the prevalence of the milder mitis infections or the more severe gravis and intermedius diphtheria. The Emergency Public Health Laboratory Service in its April *Bulletin* (p. 31) gives an analysis of the distribution of mitis, intermedius and gravis types of diphtheria bacilli during 1941, based on swabs from 8457 diphtheria patients examined at twenty laboratories, including a number of independent but associated laboratories such as those at Leeds, Liverpool and Bristol. Their material is drawn from varied, but not all, parts of the country, and unfortunately the numbers examined at individual laboratories are often too small to be significant. Liverpool was not only heavily infected with gravis but contributed about a third of the total cases and therefore loaded the gravis figure; excluding Liverpool, the average percentages become: mitis 27, intermedius 39·6 and gravis 33·4. In individual centres distribution was very variable; thus Leeds showed a high incidence of gravis and a low of intermedius; Cardiff a very low gravis incidence with high figures for the other two strains; Bristol and Carmarthen were unique in having a very high intermedius rate. In Cambridge, Conway and Oxford the gravis percentages were about 50; in Liverpool and Leicester gravis accounted for over 70%. Geographical distribution was not clear-cut; altogether the data suggest that gravis is the prevalent infecting type in north, east and central England, while intermedius and mitis are more common in the south-west, but figures for other areas including London are needed to fill in the gaps. It was possible to compare the types found in three cities in 1940 and 1941, for Bristol, Leeds and Liverpool preserved complete figures derived from much the same area in each year. The change in frequency was statistically significant. To quote one example, the percentages in Leeds in the two years were mitis, 52·1 and 33·4; intermedius, 8·8 and 15·3; and gravis, 39·2 and 51·3.

Practical difficulties prevent a fair comparison of fatality with incidence of types. Thus every laboratory examined swabs from districts outside the town in which it was situated and not all cases notified in a particular borough were necessarily reported on by the laboratory in that borough. Again, notifications included cases diagnosed clinically before bacteriological examinations had been carried out, and the diagnosis of such cases, if reversed on bacteriological examination, would not be corrected in the returns for some time to come. Anything from a third to nearly a half of cases diagnosed clinically by practitioners failed to yield diphtheria bacilli in the laboratory, but this does not mean that none of these bacteriologically negative children had diphtheria; although they are always present not every clinically indubitable case yields up its diphtheria bacilli to the swab, and to wait for bacteriological confirmation before taking action may, as every clinician knows, spell tragedy for the patient. Centres with the highest fatality also experienced a high gravis rate, but a fatality of under 4% was recorded in Leeds, Cardiff and Bristol with gravis rates 51·3, 6·8 and 8·2%. The fatality from the three types varies considerably in different areas and at different times, and it is not usually possible to pick out the particular cause operating. The factors that have to be considered are general, social, and economic conditions, virulence of the prevalent type, stage of the epidemic (waxing, waning or at its peak), standard of administrative and medical treatment, degree of immunisation of the community, and age-distribution of the cases. Careful analysis of the experience of Liverpool during 1937–40[1] showed that the percentage incidence of mitis fell from 41·1 to 17·1 and of intermedius from 24·7 to 13·3, whereas that of gravis rose from 34·2 to 69·6 in these four years. The fatality from each of the types remained remarkably constant at about 2% for mitis, rather more than 10% for intermedius and 6% for gravis infections. The high fatality from intermedius infections in this Liverpool inquiry bears out the general experience that in clinical severity, other things being equal, there is little to choose between gravis and intermedius infections. Scotland has lately experienced an epidemic wave of gravis infection with an increased fatality, a greater attack-rate in older age-groups, and in certain areas a high incidence among inoculated children—all evidence of infection by an epidemic invasive strain.

From a consideration of these and other data RUSSELL[2] thinks it possible that the type change is related in some way to the number of susceptible children in the population—gravis type prevailing when the proportion of protected children is low, mitis type when it is high. Yet it is not proven that the gravis infection always connotes high mortality. The *Bulletin* hopes that further work will reveal what effect artificial immunisation, if it becomes universal, will have on the type-distribution of diphtheria bacilli. Some localities should already be approaching the degree of immunisation when we may see a change in the prevailing types, although as D. T. ROBINSON[3] foresaw atypical strains and difficulties of classification are likely to arise where the disease is mild and none of the types has an epidemic distribution. If so, news of such increased technical difficulties of typing will be welcome because it will imply that immunisation has reached a pitch when, extended to the greater part of the most susceptible population, it will reduce the incidence of clinical cases. That such a reduction in incidence occurring in conjunction with large-scale immunisation has in fact been a case of cause and effect has

1. Wright, H. D. *J. Path. Bact.* 1941, **52**, 283.
2. Epidemiology of diphtheria during the last forty years. By W. T. Russell, D.Sc., of the statistical staff, Medical Research Council. Spec. Rep. Ser., 247. HMSO, 1s.
3. *J. Path. Bact.* 1934, **39**, 551.

been difficult to prove. Statisticians have with justice looked doubtfully at some of the figures used in evidence. From his careful study of the North American data, RUSSELL is, however, satisfied that immunisation, particularly since the inclusion of pre-school children, has substantially reduced morbidity and mortality in such towns as New York and Toronto. Their experience of diphtheria in the post-immunisation years has been significantly better than would have been expected from the trend of morbidity or mortality in the pre-immunisation period. This previous trend too should have led to epidemics in both cities between 1930 and 1940 and yet none occurred. Except for their immunisation campaign there is no obvious reason why they should have been singled out for their very favourable position. RUSSELL'S work is, therefore, a strong source of encouragement to workers in this country and deserves close study.

Annotations

THE NURSE WITH TUBERCLE

THE chances of recovery for the nurse who acquires tubercle have not, as far as we know, been statistically examined, but a well-informed correspondent (p. 30) tells us the present position of 59 tuberculous nurses known to her. Of this group, 8 are known to be dead and 3 more may be; 18 are ill at home or in sanatoriums; only 18 are working, 17 of them as nurses either at their own hospitals or in sanatoriums. No claim is made that the series is a representative sample, but it may give a rough idea of the prospect ahead of nurses who contract the disease—not a very reassuring one, it seems. In 15 at least (of whom 4 have since died) the prospect was known to have been clouded by economic difficulties. Though in theory a nurse disqualified for her work by tuberculosis gets total disablement benefit (amounting to 9*s*. a week for a single woman) there may in practice be several reasons, including the rules of the approved society to which she belongs, why this sum is reduced. She may not be entitled to full benefit, because she has not been a contributor long enough (and this is the more likely because tubercle is apt to strike early); or she may have fallen out of benefit because, for example, she gave up paying contributions while she took a midwifery course, when she needed all her money to live. Her financial position contrasts sharply with that of a woman similarly infected while serving in the Forces. In one sanatorium a tuberculous sister aged 44 was receiving 2*s*. 6*d*. a week, while an ATS girl who had been in that service only 2 years was receiving 9*s*. 6*d*., and at the same time having 11*s*. a week saved for her. It is true that a nurse who contracts tuberculosis and becomes unfit for work will usually be offered asylum in a sanatorium during the remaining years of her life: but this only provides her with food and shelter. She will still need money for outdoor clothing (if she is well enough to go out), for soap and stamps and stockings, and to supplement her diet now and then with something she fancies. These almost basic needs cannot be met on three or four shillings a week.

If she is well enough to work on the staff of a sanatorium she is sometimes subject to stringent rules, designed to protect her uninfected colleagues. Thus she may live in isolated quarters and be forbidden to enter the nurses' home; she may have to take her meals after the patients have finished, when the food is a little cold; she may eat her Christmas dinner alone and be advised to stay away from the annual dance. In the wards she works side by side with her healthy fellows, but outside the wards she is segregated, and inevitably feels cut off from the hope of normal life. Quite a number of sanatoriums are run largely by ex-patients—Nayland was an example—and in these of course a sense of isolation does not arise. But in some institutions of the kind the supervision of nurses' health is not always adequate. Now that the shortage of staff is acute there is a strong temptation to expect full-time service from anyone who is fit to work at all. Again, instead of being directly under the doctor, the nurse may have to report any fresh symptom to the ward sister or the matron, who decides whether the doctor should see her or not. While most sanatorium matrons and sisters would err on the side of over-caution, an honest impatience with trifling ailments in nurses is rather deeply ingrained in some of the seniors in the profession, and nurses have experienced rebuffs which have led to delay in treatment. And when the nurse leaves the sanatorium and goes home she will get variable treatment depending on the part of the country in which she lives. In some areas there is a well-organised expensive scheme; in others facilities are scarce.

Whether the incidence of tuberculosis is higher among nurses than among their contemporaries in other professions is not certainly known. Dr. Esther Carling[1] has made a plea in our columns for the publication of figures either to prove or disprove this. The Prophit survey[2] has given us the radiological findings in some 1500 hospital nurses, voluntary and municipal, at a first examination. The follow-up was broken by the outbreak of war, but has since been resumed and its results are eagerly awaited.

THE BROKEN HEEL

A CRUSHED os calcis is a serious injury, whether it is acquired by taking a false step from a ladder, by striking one's heel on the keel when sliding down a sinking ship's side, or by having one's ship or tank blown up by a mine. The difficulties begin with diagnosis; the associated sprain may overshadow the bony injury, or where there is no sprain the crushed bone may be deceptively painless. It is easy, too, to overlook a slighter fracture on the other side in bilateral cases. Trethowan used to emphasise the difficulty of treatment by saying that the best was a Syme amputation. In the last two years Böhler's method, in which reduction attained by screw traction on a transfixion pin and compression in a small vice is followed by immobilisation in plaster for 10–14 weeks, has got a bad name. Bankart[3] calls its results rotten, however accurate the reduction—with few exceptions, he says, it leaves a stiff foot with which no man can do a day's work. Gray[4] says it may give satisfactory radiological appearances, but besides promoting stiffness it introduces the risk of sepsis and encourages compensation neurosis because of its awe-inspiring apparatus. Few surgeons now put in pins to reduce the deformity; except perhaps when there is eversion of the heel. Gray has returned to the conservative treatment advocated by Hogarth Pringle in 1910. Any appreciable broadening of the bone is reduced with a hand clamp, but otherwise no reduction is attempted. The foot is then kept elevated, massage and movements, such as kneading a mudbath with the feet, being given but weight-bearing prohibited until consolidation is complete, judged by the disappearance of tenderness on deep pressure; this takes 2–3 months. Alternatively, the foot may be immobilised in plaster for the same period, but some say that this stiffens the foot by promoting the organisation of blood-clot. In 20 out of 23 cases these methods fitted the patient for work in 12–26 weeks; the foot, says Gray, if not painless is at least comfortable. Bankart, however, though he agrees that the results are better than after reduction and plaster, says that sooner or later traumatic arthritis produces a stiff and painful foot. Where the subastragaloid joint is involved he recommends an immediate triple arthro-

1. *Lancet*, 1942, i, 519. 2. *Ibid*, 1942, ii, 464.
3. Bankart, A. S. Blundell, *Ibid*, 1942, ii, 175.
4. Gray, C. H. *Ibid*, 1942, i, 106.

desis after excision of the scaphoid and of the cartilage from the head of the astragalus and bases of the cuneiform bones. This is followed by 4 months in plaster. In 2 cases the method left active painless feet. The operation must be done early, before the foot becomes rigid. Creer[5] maintains that, though a triple arthrodesis is necessary when the midtarsal joint is involved as well as the subastragaloid, it is better when the fracture reaches only the subastragaloid joint to arthrodese only the posterior part of that joint. If necessary he inserts a bone-graft to regain the normal curve of the midtarsal joint. Others fix this joint, which is often the only painful one, by a graft driven downwards through the neck of the astragalus into the os calcis.

THE PROPER PLACE FOR CHILDREN

FOR some years medical opinion has been hardening into a belief that children under the age of 2 should not be gathered together in groups, either in sickness or in health. This belief was strongly confirmed at a meeting of the Medical Women's Federation on June 23, when one speaker after another condemned the practice of leaving these young children for long hours in day nurseries, however good. Infection rates are high among them, and there is evidence that an infant resents the loss of its mother for long periods quite as much as an older child who can express his views more intelligibly. Dr. Marjorie Back (Middlesex county council) pointed out that the day nursery does not solve the problem of the woman who is doing whole-time work; she has no leisure to keep her home clean or to wash and mend for the children, who are bandied to and fro at fixed times between surroundings of extreme squalor and impeccable hygiene. The place for the baby under 2, Dr. Back considers, is at home, provided it is a good home with a satisfactory mother. Some felt that even bad homes and unsatisfactory mothers were to be preferred to nurseries, for the child at home is at least not exposed to the unlimited chances of cross-infection, and the health visitor can do something to ameliorate his lot. Mothers give as a reason for bringing young children to the nurseries that they cannot manage on their allowances—they must take work. But there seem to be good reasons for insisting that the mother of young children is not suitable to undertake whole-time work. Dr. Helen Mackay even doubted whether nurseries for older children were serving their purpose of releasing women for industry. She pointed out that to build and equip them uses a lot of labour, that breakages are high and proper supervision requires a large staff; yet the mother often has to stay away from work to look after a child with an infection caught at the nursery. During the course of an investigation she had spent long hours in both day and residential nurseries, and had come to feel there was a high incidence of infections in them and a low incidence of happiness. In two good nurseries taking 120 children, every child, over a period of 6 months, was absent through illness an average of one day in four. This bore out Dr. Back's finding that in a group of nurseries, over 166 nursery months, there had been 1678 days of quarantine—that is, the nurseries had been closed to new admissions for a third of their working time. Children of mothers doing whole-time jobs are left in the nurseries from 6.30 in the morning until 6 or 7 at night, and for the last three hours there is, Dr. Mackay finds, a good deal of shouting from tired women, and most of the children are crying. She thinks the nurseries, far from economising woman-power, are probably squandering it: and she doubts if the bad effects on the children are fully realised. Against this unfortunate picture must be set the experience of Mrs. F. V. Enthoven (National Society of Children's Nurseries), who finds that a properly run nursery can do much to teach the mother how to look after her child; and the conviction of several speakers that nurseries run in conjunction with a community health centre, like the pioneer centre at Peckham, would have a place after the war. Moreover, there were no complaints of the nutrition of children in war-time nurseries; evidence, as Dr. G. I. Brodie (Ministry of Health) pointed out, of the coöperative spirit of the Ministry of Food in giving the nurseries priorities in milk and other child-building rations.

5. Creer, W. S. *Proc. R. Soc. Med.* 1943, **36**, 333.

LILLIPUT LIBRARY

THE Surgeon-General's librarian in Washington is offering to send medical libraries in Britain microfilms of the G and H volumes of his *Index Catalogue*, so that the volumes themselves can be kept in safety till after the war. No doubt those libraries which have the necessary reading machine will accept his generous offer. So far the expense of these machines has combined with copyright restrictions to retard the progress of microfilms over here, though the threat of destruction by enemy action encouraged their use for copying valuable documents and business papers. For the last three years the Surgeon-General's library has run a microfilm service which will supply a copy of any article in the 4000 periodicals filed there at the nominal price of 10 cents for every ten pages. The microfilm is a photograph, usually positive, on 35 mm. cinema film. It can be read with a magnifying-glass, but this will be a tiring process for more than a paragraph or two. The reading machines made in this country throw a magnified image about the size of the original document from above on a sloping screen which will stand on one's desk; they cost from £12 upwards, and the image is not always clear. In America the Rockefeller Foundation have helped in the production of a cheap and highly serviceable "student's reader," and in time we may see every student buying such a one as he now buys a microscope or a set of bones. Apart from its obvious value in providing cheap and portable "reprints" the microfilm has made it possible to replace whole files of journals which have been destroyed in bombed or captured libraries, and Washington lately supplied microfilm copies of most of the medical journals current in the United States to fourteen centres in Free China which could not get the actual journals through. It would even seem possible to combine the airgraph and microfilm ideas, so that current articles could be sent to out of the way places like an airgraph letter. The difficulties of censorship could surely be overcome.

CONDITIONED AGAINST THE DRINK

IN Huxley's *Brave New World* the innocent babies destined for dull jobs crawled over to examine the pretty books and flowers, received an electric shock, and became conditioned against such frivolities for life. This principle—which should appeal to dictators—has not been much applied in medicine so far; but if anyone could profit from a ruthless reorientation of his inner life it would presumably be the chronic alcoholic. Many have aimed at turning these unfortunate patients sick at the sight of a bottle, and methods have ranged from putting an emetic in the drink to injecting apomorphine. Thimann,[1] following the lead of Voegtlin and Lemere,[2] believes that he has achieved an effective technique with emetine. The patient, who has had no food or sedative for 12 hours, is treated in a soundproof room which is painted a dull colour and contains, besides himself and his doctor, nothing but the two comfortable chairs on which they sit, a bar or table with bottles and glass on its spot-lit top, and (out of sight) the necessary syringe. He is thus isolated from all stimuli except those connected with the occasion, which are purposely emphasised. Thus the treatment is given in silence; the sounds he hears are the clinking of glasses, the gurgle of poured

1. Thimann, J. *New Engl. J. Med.* 1943, **228**, 333.
2. Voegtlin, W. L. *Amer. J. med. Sci.* 1940, **119**, 802. Voegtlin, W. L. and Lemere, F. *Quart. J. Stud. Alk.* 1942, **2**, 717.

liquor and finally his own retching. He smells the glass before and after drinking. The emetic solution used by Thimann is composed of emetine (gr. 50), pilocarpine (gr. 15), and ephedrine (gr. 30) in 40 c.cm. of water. An injection of 0·4–1 c.cm. of this solution is injected 4–12 minutes before the patient is given a drink. Treatment is given 4–7 times on successive days, and repeated on a single day after 1, 2, 3, 6, 9 and 12 months during the first year. Thimann has reduced the dose of pilocarpine recommended by Voegtlin and Lemere because he found a larger dose gave patients painful spasm of the bladder and intestine which distracted their attention from the treatment. He also increased the dose of ephedrine because chronic alcoholics have a low morning blood-pressure in any case, and emetine tends to lower it still further, even to the point of shock. He quotes the results of these predecessors in 1194 patients: less than 2 years after treatment 74·8% of 644 patients were still abstinent; after 2–4 years the figures were 52·5% out of 291; and after 4 or more years 51·5% out of 259. Thimann's own series only numbers 43 at present, followed over 7 months. Of these, 27 have remained entirely abstinent since treatment; but it is doubtful whether the rigours of the cure are entirely responsible, since psychotherapy accompanied the drug treatment, and patients were persuaded to spend all their weekends and leisure time at the clinic, so as to maintain a close bond with the physician. The full bearing of this father-child relationship on the abstinence (and its ultimate duration) is probably hard to assess; Thimann sees it merely as a useful adjunct to treatment. "By supplementing the monthly periods of reinforcement by weekly visits," he says, "the patient is prevented from slipping into the delusion of the conviction that he can take a social drink without relapsing." The impartial observer may feel that the value of the treatment is in doubt if the patient can take a social drink without being sick.

A LIBERAL DIRECTOR

THE retirement at the end of July of Dr. Carl Voegtlin, first chief of the first cancer institute which any nation has supported from public funds, stimulates reflections not only on the personal attainments of a distinguished director but also on research institutes limited to the study of cancer. This limitation is chiefly verbal; there is no basic science which does not contribute towards an understanding of the natural history, pathology, cause, prevention or treatment of cancer. The National Cancer Institute, founded at Bethesda, Maryland, in 1937 by the government of the United States, set out to advance knowledge in all these branches, to apply the results, to educate the public, using as its medium the *Journal of the National Cancer Institute*. To have succeeded in making a start in all these directions in the first 5 years is a great achievement. Dr. Voegtlin brought to the task wide knowledge with special training and distinction in biochemistry. This circumstance accounts no doubt for a slight bias in the work of the institute towards chemical aspects of the subject, but none has been entirely neglected. The pursuit of every branch and of almost every suggestion despite prejudice and fashion is perhaps the greatest of the director's achievements. Yet, in the history of cancer research, no basic discovery has been made in an institution devoted solely to the study of cancer. Original observations of lone individuals, working often against opposition and violent reaction, have later been confirmed and extended in cancer institutes. Directors therefore have a great responsibility to cherish all the facts previously gathered, to retest and extend in the light of new knowledge all the theories of the past, and to close, for theoretical reasons alone, no approach discovered by the pioneers. The fullest achievement will perhaps be claimed in future by those institutions which find and nourish the pioneers, in whom America is even richer than she knows. Since posterity will be the judge of their success, we of today are content to praise a liberal spirit.

The new director is to be Prof. R. R. Spencer, assistant chief of the institute.

SULPHONAMIDES IN PLASMA AND RED CELLS

WHEN sulphonamides are absorbed and reach the blood, they are not distributed equally between the red cells and the plasma, but the ratio varies with the different compounds. According to Heinemann[1] sulphanilamide is distributed so that the concentration in the water of the cells is about 1·6 times the concentration in the water of the plasma. For sulphathiazole the ratio is 0·17, and for sulphadiazine 0·3. Since the therapeutic effects depend on the concentration in the plasma rather than on that in the cells, it might be better for clinical purposes to estimate the concentration in the serum or plasma, rather than in whole blood as is the usual practice. The difference in concentration between the cells and the plasma appears to be due to part of the sulphonamide in the plasma becoming "bound" to the plasma protein, in which condition it is probably ineffective therapeutically. This combination with the proteins was first demonstrated by Davis[2] by ultrafiltration methods and has been confirmed by Heinemann, who finds that only about 10% of the sulphanilamide in the plasma is bound in this way, compared with 55% of the sulphapyridine, 80% of the sulphathiazole and 60% of the sulphadiazine. Although estimations of the concentration of sulphonamide compounds in whole blood are of real practical value as an aid to the regulation of dosage, it is clear that the drug cannot be regarded as being in simple solution; its distribution between the various components of the blood is complex.

TACHYCARDIA AND ALLERGY

Coca[3] describes a new diagnostic method which he claims provides a highly accurate practical means of identifying the excitants of food allergy. In general, food allergy is difficult to prove because cutaneous tests often fail, and the effects of trial addition and elimination diets are unsatisfactory in most cases. Coca noticed that some clinical reactions to foods were constantly accompanied by a tachycardia, and that this could be employed practically to detect the foods responsible; as a result he claims a high percentage of successes in relief of allergic symptoms. He recognises two categories of familial sensitivity: a patient of allergic heritage may show antibodies in his blood for some foods causing allergic symptoms (and positive skin tests), and, for others, tachycardia without antibodies (and negative skin tests). The characteristics of this tachycardia are a high maximal pulse-rate (90 per min. or more) and a wide range (20 or more); tachycardia and remissions alternate rapidly, and there is a latent period; the reaction may be recurrent. The foods causing symptoms are usually common ones, anyhow in America (wheat, orange, egg, beef, milk, tomato, potato, chocolate), but the excitant need not necessarily be foods, they may be drugs, metals, inhaled fumes or dusts. The symptoms experienced in most cases after these excitants, and accompanying the tachycardia, are not the usual ones of allergy; they may be nervous and emotonial instability, psychic depression, even epilepsy and dementia præcox; dizziness, neuralgia; chest-pain, angina pectoris, extra systoles, essential hypertension; and even a predisposition to the common cold. The suggestions in the book are novel but not convincing. Coca admits that a fellow allergist has half-facetiously written: "Most of us are trying to prevent the term allergy from being applied to anything and everything from ingrown toenails to alopecia."

1. Heinemann, M. *J. clin. Invest.* 1943, **22**, 29.
2. Davis, B. D. *Science*, 1942, **95**, 78.
3. Coca, A. F. Familial Nonreaginic Food-Allergy. Springfield, Illinois: C. C. Thomas. 1943. Pp. 180. $3.

Special Articles

FULLER DEVELOPMENT OF FEVER HOSPITALS

WITH SPECIAL REFERENCE TO THEIR SCIENTIFIC MEDICAL SERVICES *

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FEVER hospitals were originally isolation camps rather than medical institutions. Their provision was, in the first place, elicited almost entirely by the necessity of removing from the community a group of cases with a communal "nuisance value." This removal, it was argued, would result in a lowering of the incidence of fevers in general. The obvious necessity for early isolation concentrated medical interest on rapid diagnosis, and as there was no specific treatment for any of the fevers it seemed adequate to establish places of seclusion where these cases could be isolated and to some extent nursed.

During the last 40 years, however, there has been a gradual, and more recently a rapid, change in the understanding of the fevers. Bacteriology has been adding much to the precision of diagnosis, serotherapy is now being supported by the advent of chemotherapy, but of almost equal importance has been the growing realisation that even the most rigid policy of isolation makes little impression upon the average general incidence of the "native" infectious diseases. This last fact is of considerable medical interest but its main and immediate significance is the problem it raises: Is there any further need for the fever hospitals to be continued as isolated separate units?

The answer to the question is on general grounds, No. There is now every reason why a general hospital, say in a small town, should have a block that can deal with the fever cases of the district. In the larger centres of population there are none the less two very good arguments for the continuance of the fever hospital; first, as a concentration point for therapeutic skill, and secondly, as a place where intensive and scientifically remunerative study can be pursued.

For these two reasons alone the continuation of the larger fever hospitals is considered desirable. They should become essentially specialist hospitals with a function very similar to that of other specialist hospitals; and, like them, they have a place to fill in any scheme of regionalisation of the hospital services. In conceiving their future function, we must clear our minds of the long-established view of the fever service as something "isolated" from other forms of medical endeavour. The modern view indeed is that the infectious diseases are of prime importance, since despite modern therapy, they still cause serious morbidity and mortality in the youth of the nation, and only too often leave the young person handicapped for life. The intensive and academic study that must be given to these problems has not as yet been demanded by either the public or indeed the medical profession; the realisation of the need, however, is growing rapidly and the purpose of this paper is to suggest how that need can be met.

STATUS OF THE CLINICIAN

If the larger fever hospitals are to become main centres for the prosecution of academic research, it is of first importance that the clinician should be of academic standing, inheriting the attitude of trusteeship that is the mark of academic medicine in this country—to seek knowledge, to stand for the truth, and to give the patients the benefits that arise from his dedication. Development along this line is at present impossible since with advancing seniority he must spend more and more time as an administrator, and so much less time as a clinician. The conjunction of the offices of clinical chief and administrative superintendent was natural enough in the days when there was neither specialist treatment nor any general appreciation of the importance of research. (We need hardly recall the superintendent with a natural and active interest in research, such as the late Dr. John Brownlee). Today, the physician-superintendent of a fever hospital must have a wide knowledge of general clinical medicine, including chemotherapy, bacteriology, pathology, biochemistry and radiology, to mention a few of the aspects of this specialty, while at the same time the administration of a modern hospital grows daily more complex. Every further advance in the knowledge of infectious disease will put new demands on his clinical and scientific knowledge, and it is surely folly to hinder his continued growth as an expert clinician and scientific worker by the distraction of administrative duties.

Under any scheme for concerted investigation into the causes, epidemiology and treatment of fevers, the position of the chief clinician must become of increasing importance. To enable his full development it seems essential to adopt the already popularly mooted suggestion of an administrative superintendent (medically qualified) responsible for the administrative details of a group of fever hospitals, totalling say 1200–1500 beds, leaving the clinical chief free to supervise the more purely medical matters. Such a subdivision could be arranged and maintained and it would have the further advantage of developing a line of first-class physicians for the fever service of tomorrow.

Under the present system of double duties there is little incentive for the junior man to increase his acquaintance of the related basic medical sciences (e.g., bacteriology) or to improve his clinical knowledge, and little encouragement from above so to do, since the ruling officials are themselves almost purely administrative in function, and, therefore, in outlook. It is perhaps not too much to say that the present-day poverty of research in the infectious diseases is due to the fact that a single individual—the physician-superintendent—cannot possibly hope to fulfil his double obligations and at the same time lead the vanguard into the difficult regions of research.

Clinical appointments of the type we envisage should in view of their nature be made not by the regional hospital authority alone, but jointly with the university, and it is suggested that the chief fevers clinician of the district should be a reader in infectious disease attached to the university department of medicine. It does not seem absurd to imagine that the holder of such a readership might be a fit applicant for a senior teaching post in general medicine. Such an incorporation of the study and treatment of infectious disease into the main body of the practice of medicine would certainly have an invigorating effect on both activities. From the point of view of the management of fevers it is a matter of urgency to bring into being a service with wide contacts and high medical standing, capable of attracting men of clinical eminence. Only thus can the service live up to the heritage of those who once made Britain's name in the clinical study of fevers.

A further aspect of such appointments must be stressed—namely, that to bring out the best in the clinician it is essential that there be a limit to the number of patients under his care. We suggest that 350 beds (acute and convalescent) be regarded as the economic maximum. To the administrative mind this may seem an extravagant use of medical personnel, but from the viewpoint of the patients' welfare and the utilisation of the best that lies in the clinician, we consider this rigid limitation to be justified. Where the number of beds exceeds this limit, an assistant clinician should be appointed. Incidentally the provision of such junior posts will ensure a source of future adequately trained chiefs.

The staffing of the fever service in the peripheral towns and rural areas is at the moment also far from satisfactory, and the gloom is only relieved by a few exceptional characters who by their personal eminence have made spots of light in places and under circumstances where such high standards could in fact scarcely have been expected. The regionalisation of hospital services to which so many are turning with hope, can and must include the fever hospitals, and it should provide for them an opportunity of obtaining a clinical personnel of

* This article forms the second part of a study of the future development of the fever hospital: a general survey of the problems was published last year (Anderson, T. *Glasgow med. J.* 1942, **138**, 168).

high average quality. In such a scheme the larger provincial towns and more thickly populated semi-rural areas might continue to have their specialist fever hospitals, provided that these could support a full-time zymologist, who would belong to the service centring on the university centre. In contrast to these zones, which might be called the "peripheral centres," the small towns and the purely rural areas are in the future likely to depend for their hospital services on what we may call the county-type of general hospital. With modern transport facilities such an arrangement is quite practicable if the hospital be intelligently sited. The fever service for the rural area should be a unit of this county hospital; such a unit might be under the care of a full-time zymologist if the numbers justified it, but more commonly the full-time physician of the county hospital would be in charge of the fever block.

Although these rural areas and the peripheral centres will all branch from the university centre, it is not intended that they should be dependent upon or subservient to it, for much remains to be learned about epidemiology in the more rural areas. The appointments in the peripheral centres should, therefore, be capable of attracting senior clinicians. We do not support the view that those areas outside the main centre should be staffed merely by junior clinicians.

OTHER MEMBERS OF THE TEAM

The provision of a first-class clinical service is only the first move in the attack on zymotic disease. Research in modern medicine cannot be pursued economically by individuals, however brilliant; it calls for a team of workers, all with their own specialised knowledge. The most essential collaborator in the present case is the bacteriologist and there is little doubt that the study of epidemic disease and that of bacteriology must progress together. This conjunction has curiously enough been accomplished only to a small degree in this country, and the failure is without doubt to be related to the historical differences in the development of the two specialties. Bacteriology in Britain has reached its present eminence almost entirely within the walls of the universities and their associated general hospitals, while the study of zymotic disease has been pursued in the isolation of the fever hospitals. And yet, the fever hospitals above all desperately need a first-class bacteriological service, while these very hospitals could provide, in a way the present-day general hospital scarcely can, the most fertile fields for the academic study of bacteriology. Both these demands can be met and the necessary union of bacteriology with the fever service be effected in the following practical scheme.†

First, it is essential that each of the main fever hospitals in the university centre (e.g., in the city of Glasgow) ‡ should have a bacteriological department with a full-time director, appointed and paid jointly by the university and the regional hospital service. He would be responsible for the routine work of the hospital (and perhaps of the district surrounding the hospital) but it would be a proviso of his appointment that the routine work should not exceed a maximal amount, fixed so that he would be ensured freedom for thought and intensive research. The director of bacteriological services for the whole region would be the university professor, and he would be situated either at the university laboratories or perhaps more appropriately at the laboratory of the main fever hospital; the director of the laboratory not occupied by him should be the senior lecturer in bacteriology.

The study of biochemistry is a more recent addition to the field of medical research, but it has already added much to the knowledge and understanding of general medical diseases. Acute infections have as yet remained almost unexplored in this respect. Although it is certain that biochemistry will eventually play a highly important part in the study of infectious disease, it would seem that in the immediate future it would be sufficient to supply well-qualified technical assistants to each main fever unit to work under the general supervision of the laboratory director.

In the peripheral centres the combined general medical, surgical and fever services are likely to be of sufficient size to require a full-time bacterio-pathologist. Here, as with the clinician, the appointments should not merely be of a junior nature, although their value as training centres is obvious; they should be in themselves sufficiently attractive to encourage a suitable individual to remain even when he had reached senior rank.

The study of morbid anatomy in its widest sense we have left to the last. Although pathology has done so much to enlarge the knowledge of disease processes, it has flourished only where the authorities concerned have taken a long view; it is not a study that promises quick returns. Thus it has been situated in the universities and has served the related general teaching hospitals; this has naturally led to an almost complete preoccupation with the study of adult and terminal disease, and to a lack of opportunity for studying infectious diseases. Incidentally the modern tendency to remove all infective cases from the general hospitals has intensified this gap in British pathology, while modern surgery provides very few examples of infective disease and its behaviour. Further, since the value of pathology is largely academic (apart from the diagnosis of surgically removed tissue) there has been little actual demand for its help from the more purely utilitarian medical organisations, such as the fever service.

We cannot conceive, however, a properly directed study of infectious diseases in which research into their general pathology would not occupy a prominent position. The integration of the fever service which we have suggested would permit several hospitals to share the benefit of a first-class pathologist. It might be expected that a united fever group of 1000–1200 beds could supply a single full-time pathologist with adequate investigatable material, and yet not swamp him with routine work. Here again the person is more important than the post, and to attract a man of the right stamp and the necessarily wide training it is suggested that the director of pathology should be a university lecturer with a definite share in the teaching; he would, technically, work in close liaison with the regional director of bacteriology although his association with the university pathology department must be a real and close one. Further, his specialised knowledge of the morbid processes of infectious diseases would make him an obvious consultant on these matters for the whole region; the bacterio-pathologists of the peripheral hospitals would be able to refer to him upon all subjects coming within his sphere.

NEED FOR CHANGE

Such a plan, radical in nature, departs so greatly from the present establishment that it invites the usual critical questions. Is the change necessary, and if so, why? Even if we agree as to the need, is it great enough to justify the cost?

In answer to the first it can be said without fear of contradiction that there remains a tremendous amount still to be discovered about infectious disease. From the medical and ethical point of view, ignorance of disease is a challenge. Today this challenge can be met only by the concerted effort of a group of specialists, and it is in order to bring these men together, in conditions favourable to their work, that we regard the proposed changes as essential.

From the layman's point of view it is now a practical and realist measure to focus our resources on the preservation and restoration of the health of our youth. Every sick child in the kingdom should have an equal right to the best service that medical knowledge can provide. And to give this to the child stricken by an infectious disease demands, we believe, a service of a much higher standard than is general today.

CONCLUSIONS

There is an immediate and pressing need to concentrate medical endeavour on the fight against infectious diseases. This demands the creation of specialist

† This scheme fulfils many conditions that we personally feel are essential, but these will not all be elaborated.

‡ The reference to Glasgow and the related district is made since it happens to be the region we know best. Any mention of existing positions bears no reference to the present holders; we have intentionally avoided discussion with them or others whose minds are active on postwar planning, in the hope that our ideas may by their individual approach shed light on some small points that might otherwise have stayed in the shade.

appointments that will link academic medicine, centred on the universities, with a fever service incorporated in a regional hospital organisation.

The fever service team must include clinicians free of administrative demands, bacteriologists with a training that fits them for collaboration in research and pathologists of wide basic experience.

A scheme is briefly outlined that includes these essential workers, and provides for the future enrolment and scientific nurture of young specialists who may look forward to participating in an integrated active fever service of high medical and academic standing.

DOUBTFUL DIPHTHERIA

MEMO FROM THE FEVER GROUP OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH

ARTIFICIAL immunisation against diphtheria has much reduced the incidence of diphtheria and minimised the severity of attacks in protected or partially protected individuals. The difficulties of the practitioner called to see a case exhibiting doubtful throat symptoms are increased by this variation in the classical signs of diphtheria and possibly by his reluctance to diagnose the disease in the patient who has been, or claims to have been, immunised. It should be noted that without definite evidence of complete immunisation as shown by a negative Schick test the assumption of immunity cannot be safely made, and that diphtheria may occur, although comparatively rarely, in a Schick-negative person.

Doubtful cases present difficult problems and require full investigation; the onus of diagnosis is on the clinician—the part played by the bacteriologist, while important, must be subsidiary. There is a tendency to place undue reliance on the result of swab examination. The bacteriologist cannot possibly distinguish between active diphtheria and the carrier state, and his report must be interpreted in the light of clinical findings. Doubtful cases require a much wider investigation than is normally undertaken, and this should include examination for hæmolytic streptococci and Vincent's organisms. The value of routine swabbing before admission to hospital, which merely proves the presence or otherwise of diphtheria-like organisms, tends to be overestimated and usually results in delay in bringing the patient under expert observation.

DISPOSAL

1. *Cases in which the practitioner is reasonably certain of the diagnosis on clinical grounds.*—An adequate dose of antitoxin must be given at the earliest possible moment; this should normally be given in hospital, for it is advisable to give one maximum dose intramuscularly or intravenously or by a combination of these routes, according to the clinician's estimate of the gravity of the condition, rather than a succession of smaller doses. The practitioner should give antitoxin, therefore, only in cases where there is likely to be delay in admission, or where the condition is serious and there has been delay in calling him. The fatality in diphtheria varies directly with the number of days elapsing between onset and administration of an adequate dose of antitoxin. Antitoxin need not be withheld for fear of severe reactions: the modern protein-digested concentrated product rarely gives rise to serum-sickness or related phenomena.

2. *Cases in which the practitioner is doubtful of the diagnosis on clinical grounds.*—These can be divided into two categories: (*a*) where the balance of probability is in favour of diphtheria; (*b*) where the balance of probability is against diphtheria (this will include cases with minimal symptoms—e.g., injected throat or watery nasal discharge in which a routine swab has proved positive). All such cases require continuous observation during which the fullest bacteriological and clinical investigation must be made. It is therefore obvious that such cases should be removed promptly to hospital where appropriate treatment based on the results of the investigation is immediately available. Hospital practice varies but the following procedure is that adopted for dealing with doubtful cases in many of the most modern hospitals:

(*a*) Those in whom delay in the administration of antitoxin would be dangerous if the diagnosis of diphtheria is ultimately confirmed. Such patients must be given antitoxin immediately and full bacteriological investigation made thereafter.

(*b*) Those in whom a delay of six hours would not be dangerous. The Schick test should be performed, swabs taken and antitoxin given six hours later.

(*c*) Those in whom a delay of one day or more would not be dangerous. The Schick test should be performed and swabs taken and the administration of antitoxin deferred until the results are known.

This classification obviously depends on the clinical experience of the observer. When in doubt give antitoxin. In no case is reliance to be placed on the swab alone as the information is sometimes misleading. Every suspected case, when first seen, must either receive antitoxin and be swabbed or must be Schick-tested and swabbed.

3. *Cases with no signs or symptoms.*—No symptom-free person whose throat or nose is swabbed because of contact with an established case or for any other reason must be classed as a case of diphtheria, notified as such or sent to hospital merely on account of a positive finding. Diphtheria is a local and general reaction to virulent diphtheria bacilli and there is no such entity as symptomless bacteriological diphtheria. The procedure for dealing with carriers of all varieties is fully described in the report of the London County Council Departmental Committee on the Nomenclature of Diphtheritic Diseases (1936).

Routine swabbing of contacts, except in special circumstances—e.g., certain institutional outbreaks—is to be deprecated, and should at any rate be restricted to those showing an unhealthy nasal or pharyngeal mucosa. The child with a healthy throat and nose is not likely to harbour the KLB for more than a very brief period, and, in the absence of a catarrhal condition, is not likely to disseminate diphtheria. The waste of effort, time and material occasioned by *indiscriminate* swabbing is not justified by the very occasional discovery of a healthy carrier; it is high time that this practice was brought into line with scientific knowledge of cause and effect.

PROBLEMS OF THE SMALL HOSPITAL

The procedure outlined above may not be entirely applicable to many hospitals where there is no skilled resident staff, where the visiting staff may have neither the time nor the modern experience necessary, and where laboratory facilities may be non-existent or elementary. Under such circumstances the proper course is to err on the safe side and give full doses of antitoxin as early as possible to every potential case of diphtheria.

It is becoming increasingly evident that the day of hospitals of this type is past and that we must aim at combinations of areas large enough to justify at least a 200 bed ad hoc fever hospital. Where this is impossible a preferable alternative to the small fever hospital would be to provide fever units with at least a third of the accommodation in the form of single-bed wards in the curtilage of large general hospitals.

CERTIFICATION

One of the main functions of an infectious diseases hospital should be the admission of doubtful cases for observation and final diagnosis. Many of the large provincial hospitals, and some of those provided by joint boards, have already adopted this procedure. The LCC is prepared to issue instructions that "diphtheria observation" will be accepted as an adequate diagnosis for admission to its hospitals, and it is hoped that other hospital authorities who have not already done so will take the same step. It is unreasonable to urge the doctor to send doubtful cases to hospital without waiting for the result of swab examination and at the same time make admission conditional on an unequivocal diagnosis of diphtheria.

The public should be taught to realise that the doctor who sends a doubtful case to hospital for investigation is doing better by his patient than his fellow who waits for the result of swab examination, and that he deserves praise rather than blame if the hospital staff, with its facilities for accurate diagnosis, is able to establish that the case is not diphtheria. If there are still any infectious diseases hospitals where the staff express criticism of the notifying practitioners to the relatives when his diagnosis is not confirmed, it is high time that their attitude was changed.

Refusal on the part of hospital authorities to admit possible cases of diphtheria without a definite diagnosis may have one of two unfortunate results—it causes delay in bringing cases under skilled observation or it compels doctors to notify many cases, about which they are doubtful, as actual diphtheria. At present the error in notified diagnosis is very large; it varies in different parts of the country, being greatest in industrial areas—in London it is about 35%. Tonsillitis and rhinitis between them constitute some 80% of the errors, the remainder being made up of Vincent's angina, scarlet fever, measles, mumps, &c. Since the Registrar-General corrects only the small minority of cases in which the notifying doctor is invited and agrees to withdraw his notification, the discrepancy between the actual and the published figures of diphtheria incidence is a serious one. Admission of cases on a "diphtheria observation" diagnosis will go a long way to end this vitiation of statistics.

General agreement to admit observation cases will undoubtedly result in earlier treatment with consequent reduction in mortality and complication rates. It will also entail provision of a larger proportion of single-bed wards than exists in most hospitals; newer knowledge of infectivity has already made the large undivided ward something of an anachronism and the procedure suggested may help to expedite long overdue improvements in fever hospital construction.

In England Now

A Running Commentary by Peripatetic Correspondents

WE have been having a complicated and rather sad time with Vallombrosa. He is a very brave man, an ex-member of the International Brigade, and he has developed multiple troubles which seem to vary between fibrositis and neuritis. He does not speak very good English, and he suspects that we do not understand him. He does not understand himself: sometimes it is the muscles, he says, sometimes the nerfs. We think he suspects the nerfs as being only attacked in functional conditions, the muscles as being organic. Hence his confusion. But at any rate things are now looking up. "Tonight," he said two days ago, "an enormous big change happen." "For the better or for the worse?" I said. "For the bad," said Vallombrosa. "The pain has gone from the leg to the arm." This reminded me of the time when an epidural injection into his sacral areas made his legs worse and entirely cured his chest, so I said I was sorry. But today a further change has occurred. "Today," he said, "it is a great deal much better. Terrible. Yesterday a little bit much better, today a great deal." "It's better?" I asked. "Terrible," said Vallombrosa. I am jolly pleased about this.

* * *

It was in September, 1939, and the war was about a fortnight old, when early one morning I was awakened from the uneasy sleep that was the common lot in those days. The nightmare that had come upon us, with its then unprobed horrors, made the ordinary round of existence seem fantastic and unreal, and one lived as under a heavy weight. There were unaccustomed sounds in our quiet road—the noise of motor engines slowing and coming to a standstill, the clank of metal, voices kept low out of respect for the early hour, and the crunch of Army boots on gravel. All this had to be investigated. Never had the maids risen so early (our staff was plural in those incredible days), and we soon knew that a large convoy was parked under the trees that bordered the road and hid the lorries from any inquisitive Jerry who might be snooping round. And—a much-appreciated action—each lorry was parked with due regard for every private gateway. Soon the men in charge were the guests of every house in the road, and as time went on, and the convoy still awaited orders, we made them free of the garden, with newspapers, smokes and refreshments. It was such heavenly September weather, and in the golden autumn sunshine tired men rested in deck-chairs, or slept, stretched on rugs on the lawn. When I came in from my rounds at lunchtime our friends had vanished. "I wish they had stayed longer," said my wife. "They were so nice, and the maids loved them. They insisted on washing up all the crockery they used, and just come and look at the garden." Rather apprehensively, I followed her out to our cherished plot. The deck-chairs had been closed and stacked, and on top lay the rugs, exactly folded. My wife picked up a basket that had contained apples. In one corner of it was a neat little pile of cores, and in another a matchbox, tightly packed with cigarette ends. Not a speck of litter was in sight. "Do you remember the garden after our last sherry party?" she asked. I did, and the heap of cocktail sticks, matches and cigarette ends swept up by the gardener afterwards. A light breeze was stirring in the borders, and in the sunshine the Michaelmas daisies and chrysanthemums, in all their autumn glory, seemed to nod their heads in pleasure and satisfaction, as though they knew that their country, with its gardens, would be well defended by such considerate hands.

This was more than three years ago, and much has happened since. We do not know what has befallen our friends, but some of them, at least, may be in enemy hands. Our surplus flowers and vegetables find a ready market locally, and the proceeds go to the Red Cross and St. John Prisoners of War Fund. The garden has not forgotten.

* * *

Adults forget what it is like to be young because it is on the whole an unpleasant, an impotent, a trial and error adjusting, a humiliating time, so that they repress the memory of it, or turn it into a story, an adventure, a Sunday-school, a boy who made good, an exemplary little Eustace story, according to adult need of bolstering. Let them read *In the Service of Youth* by J. Macalister Brew (Faber. Pp. 228. 7*s*. 6*d*.). Here they stand before the judgment seat of bared memory. The book deals with the service of youth chiefly from the angle of the girls' and boys' club, but it would be read with profit by anyone who has any contact with youth at all; the works doctor and the magistrate of the juvenile court should be compulsorily examined on it, not so much for its factual content, though that is invaluable, as for the almost—yes, I choose the adjective deliberately—divine humanism that pervades it. I lived for five years as a student in a boys' club in Hoxton. Frankly I was not a success, I never felt quite at home in the gas-lit, noisy club-rooms. I came more into my own at the weekend and summer camps, for the ways of bird and beast are not altogether unknown to me, and industrial youth can be intensely interested in these. Those were the days when people used to drift down from the universities to give their culture to the lower classes—and often get far more than they gave. Some came from duty, some seeking a childhood they had not known, some perhaps because they'd rather be first class in Athens than second class in Rome, some came with the love of brothers, some with the love of parents, and some (and I know that they were the best, for they still walk and talk in the memories of boys and girls who are now middle-aged men and women) with the undifferentiated swamping, unrebuffable, humble, humorous love for all things living. Nowadays the service of youth demands, besides the proper emotional equipment, technical knowledge and skill, and this is a most readable textbook. In fact it is a great brew, with the lemon peel of a pleasant humour, the nutmeg of discernment, and the Jamaica rum of a wide compassion.

* * *

My peripatetic colleague who laments his enslavement by the telephone bell and asks what is the remedy, reminds me of old Dr. S, for many years in practice in a Yorkshire country town. S had never had a telephone in his house and did not want one. Disturbed by this unconventional behaviour, the Post Office sent round an energetic young representative to convert him. Dr. S listened attentively to the benefits which would be his if only he would have a telephone. "Young man," he asked, "do you really think that your telephone would enlarge my practice?" "Why, of course, Doctor," the canvasser responded eagerly, "it most certainly would; I guarantee it." "In that case," said Dr. S, "you may regard the matter as settled."—The canvasser's eyes gleamed triumphantly.—"Any more work is the last thing I want, so I won't have your telephone at any price." Joking apart, would the GP really lose much by not having his name in the telephone directory?

Our sisters are only happy when there are one or two bats patients in the ward, and at least two of my wards are as happy as cuckoos nowadays. We have old men who leap out of bed, and old women who threaten to. We have a drug-addict who writes letters to the rest of the patients, remarkable indeed but little more so than the psychiatrist's notes. But the nicest is Madame Schappatier, with her gangrenous big toe. We have very affectionate conversations, and this is all right as she is seventy-five. "Hullo, darling," she says. "Hullo, my angel," I say. "The baby is asleep at present," she says. "And when it is asleep, I sleep." She also told me about her finger, which is the real point of this paragraph. She says she cut it off and it lay on the floor. "And I pick it up, and spit on it, woo-woo-woo like this, and I put it on again and look, you see?" Now what I want to know is, Can she have done this? If so, why don't we try it more often? Or is she just one of the pre-bats? I should honestly like to know, and no-one tells me.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

WE have debated coal and we are assured that there is to be enough for next winter (but there must be no slacking); we have made a reform in the Foreign Service which will equip it better for the new world, and we have passed the second reading of the bill to set up the pensions appeal tribunal. Sir Walter Womersley has had a difficult course to steer in the House during recent months, but the second reading of the bill was almost completely calm. It is a much more comprehensive measure than the one passed after the first world-war, inasmuch as it includes the hearing of claims made by civilians who have sustained injuries from enemy action (war injuries), by all the Civil Defence services and by the Mercantile Marine as well as by the Navy, Army and Air Force. Introducing the measure, the Minister said it gave a definite right of appeal to all claimants who had been refused pensions; they should send him a written statement of their desire to exert this right at the earliest possible date.

Each tribunal is to have a legal chairman and a medical member. The third member will be a layman (or laywoman) of the service or category of appellant concerned. For other ranks in the fighting services the lay member will be of other-rank status and for women's appeals of the female sex. For officers the lay member will be an officer; for civilians a civilian (i.e. "not a member of the armed forces"), male or female; for CD workers a male or female CD worker, and similarly for the Mercantile Marine. It was pointed out in the debate that this great increase in numbers and in the warrants, orders and Acts of Parliament which govern the question of entitlement to pensions very much complicates the matters to be brought before the tribunal. More power or facilities for the obtaining and presentation of evidence might be required than in the case of the 1919 tribunals. The position is made more difficult by the loss after Dunkirk of a whole series of base hospital records, and this also happened in Greece, Hong Kong, Malaya and Singapore, and elsewhere. The bill also provides for setting up later tribunals, consisting of a legal chairman and 2 medical members, to act as an appeal court against final assessments by the Minister.

At the committee stage an amendment is to be moved laying the onus of proof against an appellant on the Ministry and giving him the benefit of any doubt. Another amendment seeks to ensure that tribunals have power to pay for the expenses of appellants in calling expert witnesses, medical or legal. While it is clear that the House welcomes the bill because in any event such tribunals are necessary, it is also realised that the essential matter is a change in the Royal Warrant. The anomalies at present are very many, and in view of the fact that our military and civilian forces are now so great in number, and that great forces will need to be maintained after the war, members are seeking for greater simplification. One medical member suggested the adoption of the "Beveridge principle" for the Services and proposed for consideration that any man or woman entering a service should be held insured against all forms of injury, illness or accident at all times and under all circumstances. Whether this would involve any great increase in liability for any individual service is a matter of statistics, and the Minister of Pensions has undertaken to try to get out a statement showing the percentage relationship of deaths not attributable to service to those so attributable as a guide to future discussion.

FROM THE PRESS GALLERY

Mines Medical Service

IN the debate on the coal situation Lieut.-Colonel LANCASTER urged that more medical advisers were needed than the one per region recommended in the White Paper presented a year ago. Only six medical advisers have been appointed so far, and those all within the last three months. Surely, in the light of the increasing age of the men in the coal industry and the strain of war-time, the Government would be well advised to push ahead with these appointments. Referring to suggestions in the press that malnutrition was a cause of absenteeism among miners, he said that medical research in the Midlands had found no signs of malnutrition, which was much to the credit of the Ministry of Food.—Major LLOYD GEORGE said that the measures foreshadowed in the White Paper to reduce the number leaving the industry on the production of medical certificates had already had appreciable effect. The establishment of a medical service and a tighter control of man-power had reduced wastage by a figure exceeding a rate of 3000 a year. Further reduction should follow the extension of medical and rehabilitation services. Last year there were only two rehabilitation centres in the whole country; he hoped that they would soon have eleven working. The yearly total of absences from work, for 3 days or more, caused by sickness or injury was between 150,000 and 160,000, or one man in four. In 135,000 cases absence was for 8 days or more. The mining industry had a high rate of occupational sickness, and the miner was more prone than other workers to rheumatism. But taking into account the number of men not employed in any one week, the effective rate of voluntary absenteeism was not more than 4½ per cent.

Mr. TOM SMITH, parliamentary secretary to the ministry, dealt with the closer control of men getting out of the industry on medical grounds; some of the certificates, he said, looked a little doubtful on the surface. When the medical service was set up, with a doctor in each region, it was expected that certification would be stricter. He did not claim that reduction of wastage by 3000 was entirely due to the activities of the medical inspectorate, but they had certainly had something to do with it. Taking all in all and having regard to the shortage of doctors, he claimed that his department had done remarkably well to get the medical service set up. There had been many applicants, but the department wanted to get the right type of doctor to deal with the kind of cases that mining brings, and it wanted medical men who would be prepared to go underground if necessary. In alleged cases of dermatitis among underground workers reference was made at once to a committee of skin specialists. In the past 12 months there had been more rehabilitation of injured mineworkers than there had been in the last 40 years. "The one thing that pains me," Mr. Smith added, "as an old mineworker who has always been pretty strong, is that it usually needs a war to focus attention on some of these human problems." Men from the four Scottish coalfields were being treated at Gleneagles, and other centres were getting going. But it took far more to rehabilitate a mineworker for mining than for lighter work. "When we get this thing going," he said, "we shall have it as a permanent part of the mining industry." No time had been lost in legislating for pneumokoniosis and a three-way method had been developed. First, the victims were compensated by a benefit scheme, the regulations for which were signed on June 22. Secondly, a committee of medical men and others had been set up in South Wales to advise the best methods of rehabilitating the victims. Thirdly, and perhaps most important of all, measures were being taken underground to allay

dust. Answering the question why lads will not enter the mining industry, Mr. Smith cited his own experience :

My father was a miner, and he said that I would never go to work in the pit while he lived. I did not until he died, and then I had to go into the pit. What he said was what thousands of mineworkers have said : 'My lad will never go into the pit if I can stop him.' They are still saying it. They want to see the lads have 'a better crack of the whip' in this world than they themselves have had. During the two or three years I spent on the Miners Welfare scholarship scheme committee I saw evidences of the tremendous amount of ability among the sons and daughters of British miners, but I used to be appalled when the question was put to these young people, 'Wouldn't you like to become a mining engineer?' 'Oh no,' they used to say, and when they were asked why, they would say, 'My father developed silicosis, my uncle got killed,' and so on. They wanted any kind of profession but mining.

He had great faith in British mining, but much would have to be done to encourage boys to go into the pits—sound working conditions, provision for good training, brighter colliery villages from which young people would not run away as soon as their brains developed.

QUESTION TIME

Medical Services in Tunisia

Sir FRANCIS FREMANTLE asked the Secretary of State for War if he would give some account of the arrangements and results of the hospital and medical services in Tunisia.—Mr. ARTHUR HENDERSON replied : Detailed figures have not yet been received from North Africa, but all reports show that the medical arrangements made were highly successful. The medical services which formed part of the North African Force included certain new units which had not previously been employed on active service. Such for example were the field surgical units, which were attached either to main dressing stations of field ambulances or to casualty clearing stations. These units are in effect highly mobile operating teams, designed and fully equipped to function as such in forward areas. Associated with them were the field transfusion units which have revolutionised the treatment of shock in the field. They conveyed and distributed the large quantities of blood and plasma used throughout the campaign, and together with the field surgical units played a large part in reducing the mortality-rate among casualties.

The evacuation of casualties on the whole followed lines which had been found successful in the past, but the evacuation was greatly accelerated by the transport facilities now available. These included ambulance cars, hospital trains improvised from rolling stock available locally, hospital ships and aircraft. American aircraft evacuated over 16,000 British and American troops. The divisional medical units on occasion handled as many as 400 to 600 casualties a day. The less urgent cases were sent direct to clearing stations, the cases in need of blood transfusion and resuscitation were retained, and the cases requiring immediate operations were dealt with by the field surgical units.

The hospitals in general used to accommodate casualties were general hospitals of 200, 600 and 1200 beds. The speed with which they opened on new sites and accepted casualties was one of the outstanding features of the campaign from the medical point of view. These hospitals were mainly accommodated in tents, although the administrative parts were often in buildings. Hospitals were provided with the necessary specialist personnel and equipment to deal with cases of all types, including surgical, medical, laryngological, ophthalmological, dermatological, psychiatric, neurosurgical and maxillo-facial cases. Special depots were provided to care for convalescents and for those who were lightly wounded and to ensure that they were soon fit to return to duty.

The general health of the troops and their standard of hygiene remained good throughout the campaign. This was due at least in part to the improved education of all ranks and to the better understanding by all of the problems involved.

Food-supplies in France and Belgium

Mr. T. E. HARVEY asked the parliamentary secretary to the Ministry of Economic Warfare whether he was now able to give further information as to the food situation in Belgium and France, and in particular as to the adequacy of the food available for young children.—Mr. DINGLE FOOT replied : The average weekly rations of the principal foodstuffs have remained unchanged in Belgium since my answer to Mr. Wilfrid Roberts on April 22, but the weekly ration of miscellaneous cereal foods, including roasted barley, pulses and other cereal products has been reduced from 197 to 12 grammes. On the other hand, there has been a considerable improvement in the supply of herrings. In France, also, there has been no change in the official rations for the whole country, though there have been certain local and apparently temporary cuts in the bread rations in certain departments. Recent reports further suggest that shortage of meat and vegetables in certain southern departments have been accentuated. Generally speaking, these changes affect young children along with other classes of the population. There has, however, been no change in the special milk allowances for children and nursing mothers, while milk-supplies naturally tend to improve in the summer months.

Replying further, Mr. FOOT said that the rations of milk were fully available in the case of children under three years of age and nursing mothers, but sometimes rations were not forthcoming in the case of children over three years of age.

Anti-Vaccination Propaganda

Viscount HINCHINGBROOKE asked the Minister of Health whether he was aware that the National Anti-Vaccination League was circulating literature to expectant and nursing mothers advocating a course of action with regard to vaccination and diphtheria immunisation contrary to the declared policy of his department ; and whether he had any statement to make.—Mr. E. BROWN replied : Yes. I am of opinion that they are best countered by effective and positive action. The ministry and local authorities are therefore continuing propaganda to advise parents to have their children protected by methods supported by the best medical opinion.

Does the Minister consider it is right and proper for women in this condition to be subject to a barrage of conflicting views ?—I think that on the whole the conflicting views have helped to bring the truth home to them.

INFECTIOUS DISEASE IN ENGLAND AND WALES

WEEK ENDED JUNE 19

Notifications.—The following cases of infectious disease were notified during the week : smallpox, 0 ; scarlet fever, 1686 ; whooping-cough, 1918 ; diphtheria, 540 ; paratyphoid, 12 ; typhoid, 7 ; measles (excluding rubella), 6472 ; pneumonia (primary or influenzal), 587 ; puerperal pyrexia, 154 ; cerebrospinal fever, 59 ; poliomyelitis, 5 ; polio-encephalitis, 0 ; encephalitis lethargica, 2 ; dysentery, 164 ; ophthalmia neonatorum, 97. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on June 16 was 1769. During the previous week the following cases were admitted : scarlet fever, 143 ; diphtheria, 35 ; measles, 66 ; whooping-cough, 27.

Deaths.—In 126 great towns there were no deaths from enteric fever or scarlet fever, 1 (0) from measles, 7 (2) from whooping-cough, 10 (1) from diphtheria, 52 (13) from diarrhœa and enteritis under two years, and 13 (0) from influenza. The figures in parentheses are those for London itself.

Of the deaths from diarrhœa 7 occurred in Birmingham, 5 in Manchester and 3 in Bristol.

The number of stillbirths notified during the week was 208 (corresponding to a rate of 29 per thousand total births), including 22 in London.

EPSOM COLLEGE.—At the annual general meeting held on June 18, Lord Leverhulme, the president, said he was in sympathy with widening the basis of entry into public schools, but not with making all education uniform. That would only result in a levelling down instead of up. He was confident that independent schools like Epsom College would play a distinctive part in postwar education. He congratulated the council on having reduced the deficit on the working account from £4800 to £1500, a result which would have been impossible without the willing coöperation of the boys. The council of the British Medical Association, in addition to contributing generous donations, had handed over to the Royal Medical Foundation half of a legacy of some £7000 from the late Dr. T. Connell Craig, to establish a Connell Craig fund for the alleviation of distress.

Letters to the Editor

FUNCTIONAL DISEASE OF RECTUM AND COLON

SIR,—The joint discussion at the Royal Society of Medicine (reported in your issue of June 19) clearly showed the value of interchange of opinions gained in various spheres of clinical experience. The physicians threw out the challenge of "rehabilitation" in rectal diseases. The surgeon is prone to rest content in removing the painful or disabling rectal lesion, but allows the patient to continue the aperient habit which he has acquired in his efforts to obtain an easy remedy. Natural bowel rhythm is then never restored. The psychiatrists also pleaded for rehabilitation in the sphere of the personality. In their experience diseases of the rectum and colon and disorders of defæcation unmask fear and self-centredness which may become fixed. They counselled the surgeons and physicians to listen sympathetically to the patient's attitude and views of his trouble, and to rehabilitate the mind of the sufferer to peace and to an outgoing purpose. Doctors who saw the amount of distress to the mind and the concealed handicaps to the vocational life caused by difficulties in defæcation would give time and encouragement to their patients to speak openly about their troubles. They would then give verbal or written instructions how to attain or restore the rhythmical satisfying unanxious bowel motion. Sir Arthur Hurst gave a clear description of bowel mechanism, pointing out that the colon was the natural storage depot. Failure in habit and inattention to the defæcation reflex forced the rectum to play this—its unnatural—part.

Individual responsibility entered largely into the mechanism in establishing a daily morning after-breakfast attempt to defæcate. If daily success were not attained, fears and anxieties should not be allowed to creep in. Another mechanism still remained to safeguard normal function: the "call to stool" or defæcation reflex. This arose when fæces entered into the rectum, but it was second best and if unheeded easily lost its edge. For starting and completing defæcation time was essential. The personal discipline for this was wanting in the late riser, the lazy, the rushed, the ignorant and the preoccupied. In the new town planning a responsibility lay on the architect to provide adequate and comfortable accommodation in homes and communities. The scope and importance of the subject discussed can be grasped when it is realised how much the happiness and effectiveness of 42 million people of these isles may depend on completeness of emptying the bowel each morning. More harm is done to the mind and vocation than to the body by imperfection of this function.

It was clear that of the three methods of dealing with bowel function—the strainless daily-habit rhythm, the response to the conscious call, and the aperient addiction—only the first gave satisfactory emptying of the bowel and satisfaction of the mind. The other two carried with them the sense of incompleteness of function and dissatisfaction.

Harley Street, W.1. E. T. C. MILLIGAN.

STERILITY

SIR,—In the management of a case of sterility—or rather the case of a married couple who desire children, for I am not quite sure how far the two statements are synonymous—it is always a problem to decide how far investigations should be pursued.

Your editorial of May 8 did good service in insisting that if a sperm examination is to be made it must be done thoroughly and with regard for all the complicated factors of seminal chemistry and sperm morphology; and no-one would dispute the need for such an examination in any planned scientific study of human sterility. On the other hand, in routine clinical practice there are definite objections to doing routine examinations of the semen. The main one is that in the vast majority of cases the semen is reported as normal and all the onus for the infertility is thrown on the woman, at all events in the minds of the two people directly concerned. Childless couples have already a difficult enough problem to solve if they are to make a success of their marriage, and it is unfair to make things more difficult still by allocating the responsibility to one partner. The woman is handicapped by the fact that the ovum can only be demonstrated by inference.

All that is called for in most of these cases is the demonstration that the passages are patent. It would of course be another matter entirely if more precise investigations led to precise treatment, but unfortunately at the moment this is not the case. The criticism may be raised that this subjects the woman to an unnecessary examination. The answer is that very few women object, that in no other way can the assurance of normality be given, and that the insufflation or injection of iodised oil has a definite therapeutic value.

Other objections could be raised as to the validity of semen analysis. That it is crude is evidenced by the fact that the result is expressed as a percentage of normal sperms. Since only one is needed (vide Aldous Huxley's poem), it would appear that even such a low count as 20% would leave plenty over. Of course I am aware that the proportion of normal sperms seen under the microscope is used only as an index, but the fact that such a crude index is necessary clearly shows that much sperm morphology is still far from clear.

On another point I am not completely sure of my ground, but I have the impression that a lot of our beliefs about human sperm morphology are derived from the findings in animals, notably horses, in which the position is complicated by the occurrence of abortion-producing viruses transmitted by the semen and damaging some of the sperms. As yet there has been no suggestion that these occur in man.

Liverpool. PERCY MALPAS.

INCREASED CAPILLARY PERMEABILITY IN SHOCK

SIR,—In your annotation of June 19 you say that Page and Abell "note that no evidence was found of increased capillary permeability," (ICP) "which Moon believes occurs throughout the greater part of the visceral vascular bed in shock." This statement does not agree with the conclusions of the authors, who write: "It is, of course, quite possible that some increase in permeability may have occurred short of that necessary to cause crowding together of erythrocytes" (their only criterion of ICP) "but no evidence either for or against this possibility was secured."

The rôle of ICP in shock could be established by: (1) determining the plasma-protein level, which should decrease during shock if ICP plays a part in its pathogenesis; (2) determining the albumin-globulin ratio, which should show a relative increase of the globulins; or (3) direct observation of ICP—e.g., by the passage of fluorescein through the capillary wall, which occurs only during ICP.

Chester Beatty Research Institute, S.W.3. BRUNO SCHOBER.

DOCTORS AND THE FUTURE

SIR,—If to stand first on one leg and then on the other is your usual mode of progression, I am worried about the state of your spinal cord. I tried it in the hospital corridor, but stopped quickly when I saw the expression on the face of our neurologist who unfortunately happened to be passing at that moment.

Now, Sir, what evidence have you that I "forget that the public, who are to pay something near £200 million a year for the service, will insist on a share in its management"? Even my old friend Dr. Jackson, who ought to know me better, seems suspicious of my motives. May I, to set your mind at rest, tell you very briefly of a scheme which I evolved during the "phoney war," when I sat, like many others, in an empty hospital, forbidden to use the consulting-room which lay a half-hour's run away? It has since been adopted in toto by the Aylesbury Study Group of the BMA and with very few alterations by the local division. This, and its strong family resemblance to other schemes more recently published, are my reasons for thinking that it would be generally acceptable.

The country is divided into regions, as suggested by the Nuffield Trust. Each region has one large hospital with medical school and nursing school, staffed by whole-time specialists, who might or might not be allowed private practice within its walls. Closely connected with it are a number of smaller hospitals, with equipment

equally modern, but without a medical school and with fewer specialties represented, staffed partly by whole-time specialists and partly by local GPs as assistant physicians and surgeons. Each of these second-grade hospitals has under its wing the neighbouring health centres. The health centres are not the robot institutions pictured by many correspondents in the medical press. They are convenient buildings in which the neighbouring GPs will have their consulting-rooms, complete with such modern medical necessities as dispensers, nurses and secretaries. Domiciliary practice continues as it is today. These three grades of institution are governed by their medical staffs, strengthened in the case of the hospitals by representatives of the patients.

All the medical services, including public health, in a region are coördinated by a regional committee which consists of elected representatives of the doctors of all kinds and of other relevant groups including local governments. Medical members should be a powerful minority. Medical officers of health are employed by the Regional Committee and not by local governments.

At the head of the Regional Committees is the National Board of Health. The chairman is a layman and a cabinet minister, called if you like the Minister of Health. Some of the members are laymen, appointed by the Privy Council; some are ex-officio (for instance, the presidents of the Royal Colleges); the remainder are the chairmen of a number of consultative committees. These consultative committees (General Practice, Hospital, Public Health, Medical Education, Propaganda, &c.) consist of practising doctors elected by their peers on a regional basis. The members are part-time and well paid and are re-elected (or not) every five years. They are subjected, during their terms of office, to the continual criticism of their constituents in clubs and pubs and hospitals and are unable to shelter themselves behind that thick cloak of anonymity which today enshrouds the civil servant. They know, through their chairman, what goes on in the National Board of Health, and they pass on the information to those whom they represent. They control the civil servants who do the day-to-day administration and are not controlled by them.

The National Board of Health is directly controlled by Parliament, in fact by the people, and this is the anwer to your criticism. Neither the local grocer nor the shadowy civil servant controls our doings. Through Parliament at our head, through the lay members of the National Board and Regional and Hospital Committees, our patients have the ultimate rule and final voice. But in technical matters and in our daily life we retain our personal responsibility and the dignity of a learned profession.

Whitchurch, Bucks. RAYMOND GREENE.

CERTIFICATION AND STATE SERVICE

SIR,—Though not an enthusiast for a state medical service as something intrinsically desirable, I cannot see how a Beveridge plan is possible without one. And I am inclined to think that if Sir William Beveridge were "put to the question" under 'Pentothal sodium' he would confess to the same conviction.

No man can serve two masters. The state must have accurate disinterested certification of unfitness for work and it must have the most rapid possible return to fitness to work. Hence the rehabilitation centres.

Now, in unalloyed private practice the patient's wishes are paramount. He may not wish for an accurate—perhaps brutally accurate—diagnosis. He may not be in a hurry to get well, and he usually wants a say in how he is to be made well. Very often he secretly or openly wants his doctor for a friend, confidant and even father-confessor. He likes to feel that if his wishes are not met he can change his doctor. If he pays for his doctor and for the expenses of his illness, he is probably right to demand this sort of service, and the doctor is content to supply it; even if he sometimes rebels inwardly at his slightly servile condition. As long as Free Choice of Doctor is retained, so long will the patient expect and obtain a friendly, complaisant, slightly servile medical man. I leave you to guess how long it would take a "free" medical profession to bankrupt the Beveridge plan.

As to regional medical officers supervising certification, I feel sure from experience that it would fail. They will not take the responsibility of certifying that a man is fit, and I don't blame them. It is one of the most difficult tasks in medicine, and you have to know the patient and his circumstances well to come to the right conclusion. General practitioners are good at it, but it does not pay them to use their skill.

Also it would be very humiliating for general practitioners to be supervised and overridden by certification officials, supposing you could recruit good men for such a dull job. No, far better free GPs from their servile condition, and then they would soon deal with scrimshankers and prevent the terrifying output of neurotics. They would be more efficient and make fewer mistakes than specialists and consultants. Remember! It was not GPs who invented the effort syndrome—that answer to the neurotic's prayer.

The fact is, the amount of neurotic illness is already great. Of all ætiological factors concerned in this disorder in peace-time, I should put Freedom from Want first, and next in order I should put a servile medical profession. A "free" medical profession plus the Beveridge plan would populate England with a multitude of neurotic, spineless pension and dole gatherers.

Bridlington. P. D. H. CHAPMAN.

THE NURSE WITH TUBERCLE

SIR,—When I was a patient in a sanatorium I could not help but be struck by the apparently high incidence of tuberculosis in nurses. This led me to undertake, later, some careful investigations and I have made notes on the working capacity and financial position of 59 tuberculous nurses with whom I have been in touch. Of this small personal series: 8 have died; 18 are ill at home or in sanatoriums; 4 have returned to work at their own hospitals; 13 are nursing in sanatoriums; 8 are at home, fairly well but not working, and 2 of these have married; 1 is working at civil defence; 7 I have not been able to trace and I think it likely that 3 of these have died. I have no definite information about the financial position of many of them, but I know 15 (4 of whom have since died) were in economic difficulty serious enough to affect their health unfavourably. Thus 7 had no income at all, 2 only NHI benefit (15*s.* weekly) and 4 a proportion of total disablement benefit amounting in one case to 2*s.* a week, in another 2*s.* 6*d.*, in another 3*s.* 6*d.* and another 6*s.* Approved societies have the right to withhold a part of benefit until the patient is discharged from hospital; I know of one nurse whose condition was hopeless over whom the society exercised this right: she subsisted on 3*s.* 6*d.* a week for the last 5 years of her life, being given the shelter of a sanatorium. When she died £25 had accumulated and the society advertised to try to find the next of kin.

I am not myself a nurse but I am interested in the conditions under which nurses work.

Fulham, S.W.6. E. D. ANDREWS.

TREATMENT OF OSTEOCLASTOMA

SIR,—I hesitate to criticise Dr. Brailsford, for all of us who have much to do with bone pathology owe him a great debt. Nevertheless, one feels that a scientific paper based on case-reports should be so presented that the conclusions in the discussion are adequately supported by the cases dealt with. Dr. Brailsford describes five cases, of which nos. 3 and 4 were not osteoclastomata, but were examples of chondrosarcoma. Case 2, which was also stated to be radiologically typical of osteoclastoma, has no report on the histological findings of the material removed at operation. Case 5 had no operation at all, so that though "the radiogram showed a typical osteoclastoma" we have no knowledge that it was, in fact, of this type.

I do not think Dr. Brailsford has given satisfactory scientific reason for believing that "the diagnosis can be established by radiography, and biopsy is neither necessary nor desirable"; nor for the statement that the treatment of choice, whatever the site, is X radiation. He may be right, but one would like to have better evidence in support of his views.

Exeter. NORMAN CAPENER.

Obituary

G. H. LAWSON WHALE

M D CAMB, F R C S

Mr. Lawson Whale, surgeon for diseases of the ear, throat and nose to the National Temperance and North-Western Hospitals, died at his home in St. John's Wood on June 21. Born at Woolwich in 1876 he was educated at Bradfield and Jesus College, Cambridge, qualifying in 1902 from St. Bartholomew's Hospital. After serving there as house-physician he entered the Indian Medical Service, but was soon invalided home with sprue, using this experience for his MD thesis. On recovering from this knockout he trained for the surgical fellowship and mastered the specialty to which he devoted the rest of his life. Holding a commission in the RAMC (T) he gained the Mons Star in 1914 and for the next four years was surgeon-specialist to the 53rd General Hospital. Here, with Dundas-Grant, he saw many gunshot wounds of the face and neck, and together they developed the early work in plastic reconstruction begun at the Val-de-Grâce. On these injuries he wrote more than one book in the conversational and pleasantly aggressive style that always gained him audience. A more recent book in a modern treatment series (1930) gave the practitioner in small compass a stimulating view of present opinion and practice.

Whatever Whale set his hand to do he did with his might. At Cambridge it was tennis, where he won the colours of the Grasshoppers; later it was yachting or golf or (when these failed) fishing; always he was striving to learn all he could, in his profession and outside. His hospital work—and in his time he worked at many—was done with enthusiasm and devotion. In early days his presence at a medical committee implied a certain liveliness in its proceedings, but he was a courteous fighter and spared the feelings if not the arguments of his opponents. And so it was that the painful illness of his later years, resented for its physical limitations, was mitigated by the ties of friendship.

AUGUSTE BOYES

M B GLASG

Dr. Auguste Boyes, who died at her home in Dundee on June 4 at the age of 67, was the daughter of Thomas Gilchrist Boyes of Glasgow, where she graduated MB in 1899. She first went to Dundee as resident medical officer in the Eastern Hospital, now Maryfield Hospital, and after experience as a school medical officer in Shropshire and Surrey she returned to Dundee in 1919 to succeed a medical woman who was retiring from private practice. Dr. Boyes took a keen interest in the clinical and administrative sides of medicine, and was a member of the Dundee burgh insurance committee, the panel committee and the mothers' welfare advisory clinic. As assistant county controller and director of the Dundee branch she did much work for the Red Cross Society. She also took an active part in the Soroptimist Club, the Women Citizens Association, the Dundee Art Society, the League of Nations Union and the Orchestral Society.

EDWARD HENRY HARTE

M B DUBL, D P H

Edward Harte, deputy medical officer of health for Harrogate, who died recently was a man of strong character. A slowly progressive illness "accidentally discovered" forced him to give up his practice in Blackpool, and after taking the DPH at the London School of Hygiene, he entered the public health service as assistant MOH for Croydon and soon became a great success.

Two of his colleagues write: Harte was outstandingly successful with children and their mothers, and to administrative problems he brought a sane common sense. He saw fun in everything, and his quickness of phrase and richness of expression was astonishing. We never once heard him complain of his illness, indeed he rather liked to joke about it and when he got a retinal hæmorrhage he laughed and said his senior colleague "had bought a pup." Reading was his main relaxation but he had played a good game of golf, and was also a keen bird watcher. He leaves a widow.

Notes and News

SURVEYORS OF HOSPITAL SERVICES

SURVEYS of the hospital services are now in progress throughout Great Britain and Northern Ireland, on behalf of the Ministry of Health, the Department of Health for Scotland, and the Northern Ireland Regional Hospitals Council. Both voluntary hospitals and local authority hospitals are being surveyed, but not (except in Northern Ireland) institutions for mental disorder or mental deficiency. The surveyors are:—

APPOINTED BY THE MINISTRY OF HEALTH

London (including Kent, Surrey, Sussex, Middlesex, Essex, Hertfordshire, Bedfordshire, Hampshire and Dorset).—Dr. A. M. H. Gray, Dr. Andrew Topping.

North-west and North Wales.—Mr. E. Rock Carling, FRCS, Dr. T. S. McIntosh.

BY THE WELSH BOARD OF HEALTH

South Wales and Monmouthshire.—Prof. J. A. Nixon, FRCP, Prof. R. M. F. Picken, MB, Dr. A. Trevor Jones.

BY THE NUFFIELD PROVINCIAL HOSPITALS TRUST

North-east.—Sir Hugh Lett, FRCS, Dr. A. E. Quine.

Yorkshire.—Sir Herbert Eason, FRCS, Dr. R. Veitch Clark, Mr. W. H. Harper.

East.—Sir William Savage, MD, Mr. C. H. S. Frankau, FRCS, Sir Basil Gibson.

Birmingham and West Midlands.—Mr. J. B. Hunter, FRCS, Dr. Veitch Clark, Sir Ernest Hart.

Berks, Bucks and Oxon.—Prof. G. E. Gask, FRCS, Prof. R. H. Parry, FRCP, Mr. E. C. Bevers, FRCS.

Sheffield and East Midlands.—Prof. L. G. Parsons, FRCP, Dr. G. E. Godber, Mr. S. Clayton Fryers.

South-west.—Mr. V. Z. Cope, FRCS, Dr. W. J. Gill, Mr. A. H. Griffiths.

Northern Ireland.—Lieut.-General Sir William MacArthur, FRCP, Dr. Stanley Barnes, Dr. Duncan Leys.

BY THE DEPARTMENT OF HEALTH FOR SCOTLAND

West Scotland.—Prof. J. M. Mackintosh, MD, Prof. C. F. W. Illingworth, FRCSE, Dr. R. J. Peters.

Edinburgh and South-east.—Mr. J. W. Struthers, FRCSE, and Dr. H. E. Seiler.

East and North-east.—Prof. R. S. Aitken, FRCP, and Dr. H. Hyslop Thomson.

RADIOLOGISTS' BRAINS TRUST

THE Yorkshire Tuberculosis Society, after temporary loss of function at the beginning of the war, has now regained full activity, and an interesting feature of its recent session has been a Radiologists' Brains Trust. At the first meeting of this kind, members of the society provided films—to which questions were attached, with or without clinical details—and the brains trust (Major Peter Kerley, Dr. A. S. Johnstone and Dr. A. Pollitt) provided the answers. At the return meeting, the radiologists provided the films, *without* clinical data, for the clinicians to diagnose—and a merry time was had by all. Certain deductions might be drawn from these experiments, and these, it is hoped, will be defined by further trials of strength between the two protagonists. There is no doubt about the benefits accruing, because all members can participate; and the idea may appeal to other societies, not only in the tuberculosis world.

LABORATORY ANIMALS

THE Universities Federation for Animal Welfare has found that workers engaged in animal experiments are anxious to pool their experience so that they can spare the feelings of the animals. To help matters on, the federation has already sent to 130 laboratories, on request, copies of Prof. J. G. Wright's *Veterinary Anæsthesia*. Members of the federation are now compiling information about anæsthesia of rats, rabbits, guineapigs and other animals not covered by this work; methods of killing laboratory animals; living conditions, housing and diet. The breeding of such animals, they feel, should probably be in the hands of trained personnel. A small number of experienced laboratory workers are being invited to act as a panel to approve and amend their compilation. Any of our readers who can offer views or suggestions are asked to send them to Dr. F. Jean Vinter, secretary of the UFAW, at 284, Regent's Park Road, London, N.3.

University of Cambridge

At recent examinations the following were successful:

FINAL EXAMINATION FOR MB

Part I: Surgery, midwifery and gynæcology.—D. Ainslie, J. Attenborough, A. S. Barling, W. Beautyman, S. B. Bennett, J. H. E. Bergin, V. L. Billington, L. L. Bromley, J. C. Burne, K. Chitty, M. H. Clement, W. R. Cole, M. L. Cox, R. A. D. Crawford, F. A. L. da Cunha, P. J. de Vescovi, G. H. P. Drake, H. L. English, A. M. H. Fisher, M. R. Geake, K. O. George, R. V. Gibson, A. J. Gray, J. A. Hallinan, G. Hildick-Smith, R. F. Hobson, G. M. Homan, M. C. Hudson Bennett, W. N. Ingham, I. S. King, J. A. Loveless, J. B. Lyon, R. S. Mitchison, H. A. B. Nicholls, T. Norman, R. G. F. Parker, A. N. Pearson, R. A. Peebles Brown, W. R. Probert, B. O. Reed, B. W. Rhodes, M. H. Russell, M. Sidgwick, E. S. O. Smith, P. S. Smith, D. H. K. Söltau, P. G. Somerville, I. S. Staddon, P. R. Swyer, P. Venables, D. Vérel, M. M. Walker, J. Wedgwood, D. B. B. Whitehouse, H. B. Whitmore, A. J. W. Woodroffe.

University of London

On June 23 the senate re-elected Prof. Frank Horton, FRS, vice-chancellor, and Prof. D. Hughes Parry, deputy vice-chancellor, for 1943–44.

The title of professor emeritus of the history of medicine in the university was conferred on Dr. Charles Singer on his retirement from the chair of the history of medicine at University College.

The additional MB, BS examination to be held in 1944 will begin on Jan. 31.

The degree of DSc has been conferred on Miss Emmy Klieneberger, of the Lister Institute, Mr. W. T. Russell, of the London School of Hygiene and Tropical Medicine, and Mr. T. E. Wallis, of the college of the Pharmaceutical Society.

Nuffield Provincial Hospitals Trust

At a council meeting in Cambridge on June 18 reference was made to the hospital surveys mentioned on p. 31. Suggestions were considered for the establishment of group preliminary training schools for nurses, and these were approved in principle. It was reported that, with the financial assistance of the trust, regional health and sickness bureaus have been established in the Berks, Bucks and Oxon and the Glasgow areas. It it hoped that the former may be accommodated in the Institute of Social Medicine in Oxford under the immediate direction of Prof. J. A. Ryle.

Tuberculosis Association

At a meeting to be held at Oxford from July 8 to 10, Prof. John Ryle will give an opening address on tuberculosis as a social disease. Subjects of discussion will include extrapleural pneumothorax, tracheobronchial tuberculosis, and the differential diagnosis between pulmonary tuberculosis and atypical pneumonia. The hon. secretaries are Dr. Norman England, Dr. N. L. Rusby and Dr. J. V. Hurford.

Industrial Medicine at Bristol and Sheffield

A course will be held at the *University of Bristol* on Saturday and Sunday, July 10 and 11, in coöperation with the Association of Industrial Medical Officers. The syllabus includes a visit to a factory and the following lectures: Mr. T. Bedford, D SC, heating and ventilation; Mr. R. Tugman, protective clothing and appliances; Dr. Donald Stewart, health surveys in factories; Mr. W. Sayle Creer, FRCS, foot faults in relation to form and function. The fee for the course is one guinea and applications should be sent to the dean of the faculty of medicine not later than July 7.

The third series of short postgraduate courses arranged by the faculty of medicine of the *University of Sheffield* is taking up two week-ends, beginning on Friday at 2 PM and ending at noon on Sunday, including in each case a visit to a factory. Special attention is being paid to problems of labour management, to education of young workers, and to vocational selection. During the second course, July 16–18, Dr. E. Fretson Skinner will deal with psychological stresses in industry; Dr. E. R. A. Merewether with the medical officer's approach to the factory, and Dr. W. J. Rees will demonstrate the sources of silicosis risks. Mr. A. H. Dodd will show some simple works tests for atmospheric pollution, and there will also be an exhibit of eye protection apparatus arranged by the Northern Counties Association for the Blind. On Friday the factory visited will be an old-established glass-making works at Rotherham. On Sunday, Mr. T. W. McCullough will lecture on industrial accidents, and Dr. J. L. A. Grout on injuries to bones and difficulties in interpretation of radiograms. The course is limited to 40 and reference should be made to the Dean of the Faculty of Medicine, The University, Western Bank, Sheffield, 10.

University of Glasgow

On June 25 the degree of MD was conferred on Archibald Dick (with high commendation) and Hugh Stewart.

Medical Casualties

The following casualties among RAMC officers have been announced:

Killed in action.—Captain A. O. Karstaedt, MB LPOOL.

Wounded.—Lieutenant F. K. Crittenden, MRCS; Captain G. D. McIntosh, MC, MB EDIN.; Captain J. M. McKiddie, MB ABERD.; Captain G. D. Park, MB GLASG.; and Captain W. F. White, MB GLASG.

A SPANISH-ENGLISH MEDICAL VOCABULARY.—Mr. M. G. MCELLIGOTT, FRCSI, writes from Heathwood, Bushey Heath, Herts, that he has compiled a Spanish-English medical vocabulary which has been examined and approved by a Spanish surgeon of distinction. Before the work goes to press he would welcome suggestions from Spanish-speaking doctors how to make it most useful for ready reference.

VITAMIN-C SUBNUTRITION IN GINGIVO-STOMATITIS.—The paper with this title appearing in our issue of May 22 (p. 640) described investigations by Lieut. F. Stuhl carried out between November, 1941, and March 1942. The author at that time did not hold a commission in the RAMC, and our heading of the paper ought not to have mentioned his present military status. Though formally submitted to the War Office, the article was not subject to the usual military censorship; and we are asked to point out that the views expressed in it are not necessarily those of the Army Medical Department.

ESTIMATION OF SERUM BILIRUBIN AND SULPHANILAMIDE.—The last two lines of the third paragraph of Rappaport and Eichhorn's paper on this subject (*Lancet*, 1943, i, 62) should read: "To prepare the fresh reagent mix 10 c.cm. of diazo 1 with 0·6 c.cm. of diazo 2" (*not* "2·0 c.cm. of diazo 2").

Appointments

EEDY, G. S., MB BELF.: deputy medical superintendent at Yardley Green Road Sanatorium, Birmingham.

GLASS, MARGARET, BSC, MB GLASG., DPH: temp. MOH for Southall.

HIRSCH, MAX, MD BERLIN: temp. asst. MO for Northamptonshire and RMO at St. John's Emergency Maternity Home, Northampton.

LEA, D. E., PH D: advisory physicist to the radiotherapeutic centre at Addenbrooke's Hospital, Cambridge.

MACDONALD, F. G., MRCS, DPH: director of VD clinic at Queen Mary's Hospital for the East End, London.

OLMSTEAD, G. ALLISON, MB EDIN.: RSO at Worcester Royal Infirmary.

Births, Marriages and Deaths

BIRTHS

BROWNE.—On June 20, at Oxford, the wife of Flight-Lieutenant R. C. Browne, MRCP—a son.

CHARLES.—On June 4, at Bournemouth, the wife of Major Gilbert Charles RAMC—a son.

HARMER.—On June 24, the wife of Mr. Michael Harmer, FRCS—a son.

HAY.—On June 6, at Newcastle-on-Tyne, the wife of R. K. Hay, MB, lieutenant RAMC—a daughter.

HOPKINS.—On June 20, at East Malling, Kent, the wife of Surgeon Commander W. A. Hopkins, RN—a son.

HUGHES.—On June 15, at Woking, the wife of Lieutenant Stephen Hughes, RAMC—a son.

KERR.—On June 8, at Cairo, the wife of Captain John Guthrie Kerr, RAMC—a son.

SCOTT.—On June 8, the wife of Dr. R. H. Scott, of Hook, Hants—twins.

SIDDONS.—On June 25, in London, the wife of A. H. M. Siddons, M CHIR, squadron-leader RAFVR—a son.

YARRED.—On June 19, at Godalming, Surrey, the wife of Lieutenant Harwood Yarred, RAMC—a daughter.

MARRIAGES

COCHRANE—HASLOP.—On June 19, Herbert Lees Cochrane, FRCS, to Sheila Haslop, MRCS.

LAUBER—WERTHEIMER.—On June 26, in London, Henry K. J. Lauber, MD, to Erica Jenny Wertheimer.

WILEY—CHANEY.—On June 12 at Wimbledon, William Verner Caldwell Wiley, MB, to Jean Chaney.

DEATHS

BURTON.—On June 21, at Cheltenham, Edward Theodore Burton, MRCS, surgeon captain, RN, retd.

LEATHEM.—On June 24, at Sanderstead, Alfred Newman Leathem, MRCS.

TYLER.—On June 21, in London, Margaret Lucy Tyler, MD BRUX., LRCPE.

VICKERS.—On June 19, at North Stoke, Oxfd, Norman Bromer Vickers, surgeon lieutenant commander, RN, retd.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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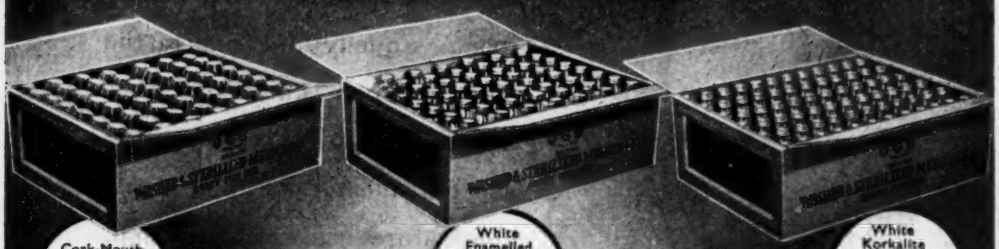

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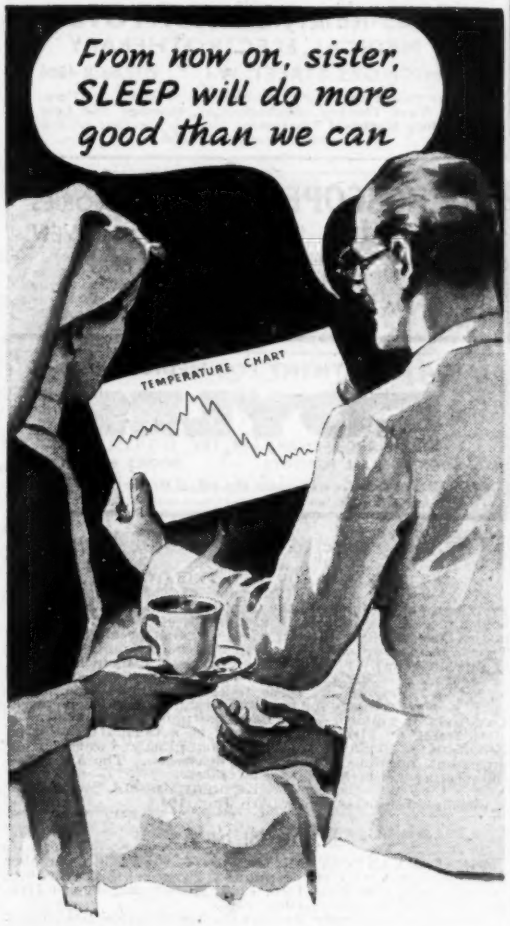

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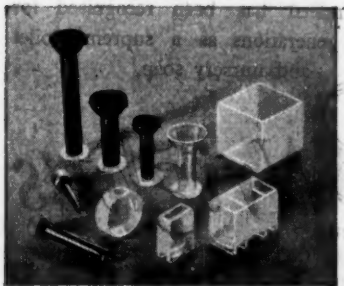

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Royal College of Surgeons of England.

CENTENARY OF THE FELLOWSHIP.

In celebration of the Centenary of the Fellowship the President and Council of the Royal College of Surgeons will hold a reception from 8 to 10 P.M. on the evening of 21ST JULY in the Great Hall of Lincoln's Inn (by kind permission of the Treasurer and Masters of the Bench of the Honourable Society of Lincoln's Inn). Fellows of the College, and their ladies, will be welcome: owing to paper restrictions invitations will not be issued to Fellows, but those desiring to attend are asked to apply to the Secretary for tickets, stating the number required. Day dress or uniform—academical costume if convenient.

At 3 P.M. on 21st July there will be a General Meeting of Fellows of the Royal College of Surgeons of England when various important questions will be under discussion. The Agenda of the meeting will be issued at a later date.

KENNEDY CASSELS, Secretary.

Lincoln's Inn-fields, W.C.2, 7th July, 1943.

L. M. S. S. A.

FINAL EXAMINATION: SURGERY, August 9th, October 11th, November 8th, 1943; MEDICINE, PATHOLOGY, August 16th, October 18th, November 15th, 1943; MIDWIFERY, August 17th, October 19th, November 16th, 1943.

For regulations apply REGISTRAR, Apothecaries' Hall, Black Friars-lane, London, E.C.4.

University of London.

EXAMINERSHIPS IN MEDICAL SUBJECTS.

The Senate invite applications for Examinerships in the following subjects of Examinations in the Faculty of Medicine for 1944:—

Medicine; Surgery; Obstetrics and Gynæcology: Therapeutics.

Applications must be received not later than 1st September, 1943, by the ACTING PRINCIPAL, University of London, c/o Richmond College, Richmond, Surrey, from whom further particulars and forms of application may be obtained.

University of London.

KING'S COLLEGE.

REVISION COURSES in ANATOMY and PHYSIOLOGY will be held during AUGUST and SEPTEMBER, commencing on Monday, 23rd August, 1943.

Fee for each subject £3 3s.

Applications for admission or further details should be addressed to the DEAN of the Medical Faculty, King's College, Strand, W.C.2.

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A Private Hospital for the Treatment and Care of Mental and Nervous Illnesses in both Sexes.

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This REGISTERED Hospital is situated at Monks Orchard in some 250 acres of park, pleasure and farm grounds. Application can be considered on behalf of patients of the educated classes in a presumably curable condition.

With a view to early treatment voluntary or uncertified patients are admitted.

Patients who can contribute 5 guineas weekly towards the cost of treatment and maintenance may be received as vacancies arise. The Committee will also consider applications for admission at lower rates and in certain cases will be prepared to admit patients free of charge.

The comfort of sensitive patients is greatly enhanced by the fact that the majority are given single bedrooms.

TREATMENT ON MODERN PRINCIPLES. Every facility for specialised investigation and treatment is provided in the Lord Wakefield of Hythe Science and Treatment Unit, including RADIOLOGICAL and DENTAL DEPARTMENTS, BIO-CHEMICAL, PATHOLOGICAL and PSYCHOLOGICAL LABORATORIES.

The Medical Staff have access to a panel of Consultants in cases which present unusual symptoms requiring specialised investigation and treatment.

Under the direction of qualified officers HELIO-THERAPY, HYDRO-THERAPY and ELECTRO-THERAPY are administered in the Physio-Therapy Department.

SPECIALISED TREATMENT of various forms is given to suitable cases.

OCCUPATIONAL THERAPY in the form of various Arts and Crafts is actively encouraged from the medical aspect and under the guidance of a competent instructress this department has proved most effective as a therapeutic factor in all stages of mental illness.

The promotion of physical fitness is a prominent item of treatment and this is enhanced by arrangements for patients to take part in Outdoor and Indoor Sports and Entertainments.

Application should be made to the Physician-Superintendent.

THE MAUDSLEY HOSPITAL, Denmark Hill, S.E.5

A CLINIC for Neurosis and Early Psychosis of Good Prognosis instituted by the London County Council. *Facilities for out-patient treatment only.* Cases seen from 10 A.M. to 12 NOON from Monday to Friday inclusive. Patients seen by appointment, which can be arranged by the Social Worker, Maudsley Hospital. Clinics for children held at Maudsley Hospital at 10 A.M. on Mondays and Wednesdays.

Out-patient Clinics for adults held also at St. Charles' Hospital, St. Charles' Square, Ladbroke Grove, W.10, on Wednesdays at 10 A.M. in winter and 2 P.M. in summer, and on Fridays at 10 A.M. (throughout the year); at St. Mary (Islington) Hospital, Highgate Hill, N.19, on Tuesdays and Fridays at 2 P.M.; and at Mile End Hospital, Bancroft Road, E.1, on Thursdays at 10 A.M. and 2 P.M.

Attendance at the Children's Clinics at Maudsley Hospital, and at the Clinics at St. Charles', St. Mary (Islington) and Mile End Hospitals by appointment with the Psychiatric Social Worker at Mill Hill E. Hospital, N.W.7.

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FOR NERVOUS AND MENTAL DISORDERS

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MEDICAL SUPERINTENDENT: THOMAS TENNENT, M.D., F.R.C.P., D.P.H., D.P.M.

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This is a Reception Hospital in detached grounds with a separate entrance, to which patients can be admitted. It is equipped with all the apparatus for the complete investigation and treatment of Mental and Nervous Disorders by the most modern methods: insulin treatment is available for suitable cases. It contains special departments for hydrotherapy by various methods, including Turkish and Russian baths, the prolonged immersion bath, Vichy Douche, Scotch Douche, Electrical baths, Plombieres treatment, etc. There is an Operating Theatre, a Dental Surgery, an X-Ray Room, an Ultra-violet Apparatus, and a Department for Diathermy and High-frequency treatment. It also contains Laboratories for bio-chemical, bacteriological, and pathological research. Psychotherapeutic treatment is employed when indicated.

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Two miles from the Main Hospital there are several branch establishments and villas situated in a park and farm of 650 acres. Milk, meat, fruit, and vegetables are supplied to the Hospital from the farm, gardens, and orchards of Moulton Park. Occupational therapy is a feature of this branch, and patients are given every facility for occupying themselves in farming, gardening, and fruit growing.

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For terms and further particulars apply to the Medical Superintendent (TELEPHONE: No. 2356 and 2357 Northampton), who can be seen in London by appointment.

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INTERVIEWS IN LONDON BY APPOINTMENT.

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The following appointments as Examining Surgeon under the Factories Act, 1937, are vacant.

Applications should be sent to the CHIEF INSPECTOR OF FACTORIES, 28, Broadway, London, S.W.1.

District	*County*	*Latest date for receipt of application*
ABERDEEN	ABERDEEN	13TH JULY, 1943
GUISELEY	YORK (WEST RIDING)	12TH JULY, 1943

West London Hospital, Hammersmith, W.6.

Applications are invited from registered medical practitioners (Male and Female) for the following appointments, vacant 1st August:—

CASUALTY OFFICER (B2). Salary is at the rate of £150 per annum, with the usual residential emoluments. R and W practitioners who now hold A posts may apply.

HOUSE SURGEON (A), HOUSE PHYSICIAN (A), and CASUALTY OFFICER (A). Salary is at the rate of £100 per annum, with the usual residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

The appointments will be for periods of six months.

Applications, with particulars of age, medical school, experience, and qualifications with dates, accompanied by copies of three testimonials, should reach me not later than 10th July.

H. A. MADGE, Secretary.

Queen Elizabeth Hospital for Children,
Glamis-road, Shadwell, E.1.

APPOINTMENT OF HOUSE PHYSICIAN (A).

Applications are invited from registered medical practitioners, Male or Female, for the above appointment now vacant. The duties may include some duty at the Hospital's main In-patient Department at Bayford, Herts. Salary at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification who are liable to service under the National Service Acts may apply. The appointment will be for six months.

Applications, accompanied by not more than three testimonials, must be made to the address given below on forms to be obtained from the undersigned and should be returned not later than 10th July, 1943.

CHARLES H. BESSELL, General Secretary.
Queen Elizabeth Hospital for Children, Hackney-road, E.2.

St. Mary's Hospital, W.2.

MEDICAL SUPERINTENDENT AND RADIUM REGISTRAR (B1).

Applications are invited for the above post from medical practitioners with at least four years' experience, who have held the post of Resident Medical Officer at this or some other general hospital approved by the Board of Management. The successful candidate will be expected to hold a contract under the E.M.S. Salary at the rate of £550 per annum, with board and residence provided. The appointment is for a first period of twelve months as from the 1st September, 1943. Suitably qualified R practitioners holding B2 appointments, also those holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating nationality, permanent address, date of birth, qualifications with dates, and details of previous appointments held, together with copies of not more than three testimonials, should reach the undersigned by Saturday, 10th July.

E. W. STOCKWELL, Secretary.

The Princess Louise Kensington Hospital for Children,
ST. QUINTIN-AVENUE, North Kensington, W.10.

Applications are invited for the appointment of RESIDENT MEDICAL OFFICER (B2), wanted by 5th July. Salary is at the rate of £200 per annum, with full residential emoluments. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply, when appointment will be limited to six months.

Applications, stating age, nationality, qualifications, and accompanied by copies of recent testimonials, to the SECRETARY.

British Postgraduate Medical School
(UNIVERSITY OF LONDON).

Applications are invited for the post of Part-time CLINICAL ASSISTANT in the TUBERCULOSIS DISPENSARY.

Further particulars as to duty and salary can be obtained on application to the DEAN, British Postgraduate Medical School, Ducane-road, Shepherd's Bush, W.12.

Poplar Hospital requires, for the period of the war, a TEMPORARY HONORARY PHYSICIAN.

Honorarium £45 per annum.

Applications, with three recent references, should be addressed to the SECRETARY, Poplar Hospital, E.14, on or before the 7th July.

Miller General Hospital,
Greenwich High-road, S.E.10.

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1), vacant 1st August, 1943. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. Salary is at the rate of £550 per annum. Subject to appointment by E.M.S. Suitably qualified R practitioners holding B2 appointments, also those holding B1 appointments and rejected by the R.A.M.C., may apply.

Form of application can be obtained from—
19th June, 1943. E. E. MARKS, Secretary.

The Princess Beatrice Hospital,
Earl's Court, S.W.5. (General Hospital—88 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE PHYSICIAN (A), vacant Monday, 26th July, 1943. Salary is at the rate of £130 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of not more than three testimonials, should be sent not later than the 19th July, 1943, to: G. PURSSELL, Acting House Governor.

The Royal National Throat, Nose and EAR HOSPITAL, Gray's Inn-road, W.C.1.

Applications are invited from registered medical practitioners, Male and Female, for appointment as HOUSE SURGEON (B2), vacant 1st August. Salary at the rate of £100 per annum, with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months; otherwise it will be for a period of nine months.

ASSISTANTS IN THE OUT-PATIENT DEPARTMENT.

There are vacancies for attendance any day at 10 A.M. or on Tuesdays, Thursdays, and Fridays at 2 P.M. The posts, which are honorary ones, afford an opportunity of acquiring an extended knowledge of the specialty, as the duties consist of assisting the Surgeons in seeing the patients.

Applications should be sent without delay to—
JOHN H. YOUNG, Secretary-Superintendent.

Hampstead General Hospital,
Haverstock Hill, N.W.3.

Applications are invited from single medical Men or Women for resident post of JUNIOR MEDICAL OFFICER (B2), embracing both surgical and medical work, vacant 1st August or preferably 24th July, 1943. Salary £133 6s. 8d. per annum, tenable for six months. Practitioners within three months of qualification and liable under National Service Acts may apply, when appointment will be temporarily down-graded to A. Practitioners qualified more than three months and liable under the National Service Acts (males must be rejected by the R.A.M.C.) may also apply.

Applications on the prescribed form, with copies of three testimonials, to be returned not later than 15th July, 1943.

KENNETH A. F. MILES, House Governor.

The Elizabeth Garrett Anderson HOSPITAL, Euston-road, N.W.1.

Applications are invited from registered medical Women practitioners for the appointment of HOUSE PHYSICIAN (A), vacant 1st August, 1943. Appointment for six months. Salary £100 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

Applications, with two copies of each of three testimonials, should be sent to the SECRETARY by Tuesday, 20th July.

Albert Dock Seamen's Hospital and FRACTURE CLINIC.

Applications are invited from Male registered medical practitioners for the appointment of HOUSE OFFICER (B1), now vacant. Salary is at the rate of £350 p.a., with full residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating age, qualifications with dates, and accompanied by copies of three recent testimonials, to be sent to the undersigned, marked "Albert Dock."

F. A. LYON, Secretary.

Seamen's Hospital Society, Greenwich, S.E.10.

Metropolitan Hospital, London, E.8.

Applications are invited from registered medical practitioners, Male, for the appointments of HOUSE SURGEON (A) and HOUSE PHYSICIAN (A), vacant 1st August. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications should be made as soon as possible to—

FRANK JENNINGS, House Governor and Secretary.

Tilbury Hospital, Essex.

Applications are invited from registered British Male or Female practitioners for the appointment of RESIDENT HOUSE OFFICER (A), which will include the duties of Casualty Officer, vacant 1st August, 1943. Salary at the rate of £160 p.a., with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of six months.

Applications, stating age, qualifications with dates, and accompanied by copies of three recent testimonials, to be sent to the undersigned, marked "Tilbury." F. A. LYON, Secretary.

Seamen's Hospital Society, Greenwich, S.E.10.

Bolingbroke Hospital, Wandsworth Common, S.W.11.

Applications are invited from registered medical practitioners (Male) for the appointment of RESIDENT SURGICAL OFFICER (B1), vacant 1st August, 1943. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. Salary will be according to experience with a minimum of £350 per annum, subject to appointment by the Emergency Medical Service. Suitably qualified R practitioners holding B2 appointments, also those holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating age, nationality, qualifications, and experience, accompanied by copies of three recent testimonials, should be sent by the 14th July, 1943, to—

W. S. RANDOLPH BISS, Secretary-Superintendent.

Middlesex County Council.

PHYSICIAN (B1) required for paediatrics by Middlesex County Council at WEST MIDDLESEX COUNTY HOSPITAL, Isleworth, Middlesex.

Applicants must be registered medical practitioners of high qualifications and professional attainments who have held resident appointments in one or more children's hospitals or departments and have had considerable experience in all branches of paediatrics. Commencing salary £650 p.a. Annual increments not exceeding £50 up to maximum of £1000 p.a. may be considered. Whole-time duties, such as Council may require, under direction of Medical Superintendent. Appointment is unestablished, subject to medical examination and three months' notice. Salary is inclusive; any fees received must be paid to County Council. Post now vacant.

Applications, stating age, nationality, qualifications, present post, and previous experience, and enclosing copies of not more than three recent testimonials, to be made to the undersigned "B1." Application forms not provided. Relationship to any member or officer of the Council to be disclosed in the application. Canvassing, direct or indirect, disqualifies. Closing date 10th July, 1943.

C. W. RADCLIFFE, Clerk of the County Council.

Middlesex Guildhall, Westminster, S.W.1.

Borough of Erith.

ASSISTANT MEDICAL OFFICER OF HEALTH.

The Erith Borough Council invite applications for the above temporary post. The duties consist mainly of work in the School Medical Department, but will include duty in any section of the health services of the Council. Preference will be given to candidates holding a qualification in Public Health or State Medicine.

The appointment is a temporary one for a period not exceeding two years and is terminable by three months' notice on either side. The salary is at the rate of £600 per annum.

Applications, accompanied by copies of not more than three recent testimonials, must be made on forms obtainable from the Medical Officer of Health, Council Offices, Erith, and be returned to reach the undersigned not later than Monday, 12th July, 1943, endorsed "Assistant Medical Officer of Health."

Canvassing, directly or indirectly, will disqualify.

J. A. CROMPTON, Town Clerk.

Council Offices, Erith, 24th June, 1943.

Borough of Southall.

APPOINTMENT OF TEMPORARY FEMALE ASSISTANT MEDICAL OFFICER OF HEALTH.

Applications are invited from qualified Women for the above appointment.

The person appointed will be required to reside in or near the Borough and to devote her whole time to the duties in connexion with the Corporation's Maternity and Child Welfare Centres and War-time Nurseries, and will also be required to carry out such other duties as the Council may from time to time direct. She will not be permitted to engage in private practice.

Candidates should not be under the age of thirty-two years or liable for national service.

The salary will be at the rate of £500–£25–£700 per annum, plus cost-of-living bonus. The commencing salary will be according to the experience and qualifications of the person appointed. The appointment is likely to continue for the duration of the war, but will be determinable by one month's notice in writing by either party at any time.

Applications, stating age, qualifications, and experience, present and previous appointments, whether or not the applicant is related to any member or chief officer of the Council, and accompanied by copies of three recent testimonials, must be delivered to the undersigned not later than NOON on Saturday, 24th July, 1943.

Canvassing any member of the Council or any Committee thereof, directly or indirectly, will disqualify.

M. LINDSAY TAYLOR, LL.B., Town Clerk.

Town Clerk's Offices, South-road, Southall, Middlesex, 7th June, 1943.

County Borough of Middlesbrough.

PUBLIC HEALTH DEPARTMENT.

HEMLINGTON EMERGENCY HOSPITAL.

Applications are invited from registered medical practitioners for the appointment of ASSISTANT RESIDENT MEDICAL OFFICER (B2). The salary is at the rate of £300 per annum, together with full residential emoluments. The successful candidate will be required to pass satisfactorily a medical examination. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months; otherwise it will be for a period of twelve months.

Applications to be sent to the Medical Officer of Health, Public Health Department, Municipal Buildings, Middlesbrough, not later than Tuesday, 13th July, 1943.

PRESTON KITCHEN, Town Clerk.

Municipal Buildings, Middlesbrough, 26th June, 1943.

City of Leeds.

Applications are invited from qualified and registered medical practitioners for the post of ACTING CHIEF CLINICAL TUBERCULOSIS OFFICER. Candidates must be graduates of a British university or Members of the Royal College of Physicians of England.

The appointment is a temporary one and will be subject to review at the end of the war, or if necessary before. The consent of the Minister of Health has been obtained to the filling of the vacancy. Applicants, who should preferably be ineligible for military service, must have had experience in the treatment and care (dispensary and sanatorium) of persons suffering from tuberculosis, have had experience of medical and surgical practice in a general hospital, and be acquainted with modern methods of diagnosis and treatment of tuberculosis. The salary will be in accordance with qualifications and experience, with a minimum of £1000 and a maximum of £1200.

Applications, on a form to be obtained from the Medical Officer of Health, 12, Market-buildings, Leeds, 1, together with copies of three recent testimonials, endorsed "Tuberculosis Officer," must be delivered to me at the Civic Hall, Leeds, 1, not later than 10 A.M. on Monday, 12th July, 1943.

O. A. RADLEY, Town Clerk.

Manchester Royal Infirmary.

Applications are invited from registered medical practitioners for the appointment of a Full-time MEDICAL CHIEF ASSISTANT (B1), non-resident, now vacant. Applicants must have held house appointments and had medical experience. Preference will be given to candidates holding higher qualifications. R practitioners holding B2 posts are invited to apply. Salary is at the rate of £450 per annum.

Applications, stating age, nationality, qualifications with dates, experience and details of previous appointments, and accompanied by copies of three recent testimonials, should be forwarded not later than Saturday, 24th July, 1943, to the undersigned.

By Order,

F. J. CABLE, General Superintendent.

Nottingham City Hospital.

MATERNITY DEPARTMENT. (100 Beds.)

Applications are invited from registered medical practitioners (Male) for the appointment of RESIDENT OBSTETRIC HOUSE SURGEON (A). The appointment will be limited to six months. Salary at the rate of £250 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

Applications, stating age, qualifications with dates, and nationality, should be accompanied by copies of three testimonials and sent to: J. E. RICHARDS, Town Clerk.

The Guildhall, Nottingham, June, 1943.

County Borough of Warrington.

BOROUGH GENERAL HOSPITAL. (300 Beds.)

Applications are invited from registered medical practitioners for the post of RESIDENT MEDICAL OFFICER (B2). Salary £225 per annum, together with board, residence, and laundry. There are two other Medical Officers in residence; good opportunity for experience in midwifery and surgery. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months; otherwise not to exceed one year.

Applications, stating age, qualifications, and experience, and date available to commence duties, together with copies of not less than three testimonials, to be sent not later than Saturday, 17th July, 1943, to—

STUART F. ALLISON, Medical Officer of Health.

Health Department, Warrington, June, 1943.

The Children's Hospital,

KING EDWARD VII MEMORIAL, BIRMINGHAM, 16.

FIRST ASSISTANT TO THE EAR AND THROAT DEPARTMENT.

Applications are invited for the above post. Salary will be at the rate of £800 per annum, with lunch and tea when on duty; or board, residence, and laundry can be provided, for which a deduction of £100 per annum will be made. Candidates should be Fellows of the Royal College of Surgeons of England, Edinburgh, or Ireland, and must have had previous experience in ear, nose, and throat work. There is a very large Ear and Throat Department, which gives considerable operative experience.

Applications should be sent forthwith to—

24th June, 1943. HAROLD F. SHRIMPTON, House Governor.

Goodmayes Emergency Hospital,

GOODMAYES, ILFORD, ESSEX.

Applications are invited from registered medical practitioners for the appointment of HOUSE OFFICER (B2), now vacant. Duties are mainly in connexion with Ear, Nose, and Throat and Ophthalmic cases, but there is a small amount of general surgical and medical work. Salary is at the rate of £200 per annum, with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months.

Applications to the MEDICAL SUPERINTENDENT.

Clayton Hospital, Wakefield,

AND PONTEFRACT GENERAL INFIRMARY.

Applications are invited for the position of CONSULTING PHYSICIAN as a joint appointment to the above Hospitals at a salary of £800 (Eight Hundred Pounds) per annum, with facilities for private consultant practice. The candidate will be expected to reside within easy travelling distance of both Hospitals. M.R.C.P. essential.

Applications, together with copies of three recent testimonials, to be sent by 26th July to the CHAIRMAN OF THE BOARD OF GOVERNORS, Clayton Hospital, Wakefield, from whom further particulars may be obtained on request.

Newcastle upon Tyne Eye Hospital.

Applications are invited for the position of HOUSE SURGEON (A) (Male or Female), at a commencing salary of £200 to £300 per annum (according to previous experience), all found. The staff consists of three House Surgeons and the Hospital is recognised for the purposes of the D.O.M.S. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications, with testimonials, should be addressed to the SECRETARY, Eye Hospital, St. Mary's-place, Newcastle upon Tyne.

The Kidderminster and District General HOSPITAL.

Applications are invited from registered medical practitioners for the post of RESIDENT SURGICAL OFFICER (B1) at the above Hospital. Candidates holding the Fellowship Examination of the Royal College of Surgeons of England or Edinburgh will be preferred. The salary will be at the rate of £300–£350 per annum, according to experience, with board and lodging. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, with copies of three recent testimonials, should be sent at once to: C. M. SMITH, House Governor and Secretary

The Prince of Wales's Hospital,

PLYMOUTH.

Applications are invited for the post of HONORARY SURGEON to the EAR, NOSE, AND THROAT DEPARTMENT.

Candidates must be masters of surgery of the United Kingdom or Fellows of the Royal College of Surgeons of England or Edinburgh, or must hold the special diploma in Oto-rhino-laryngology.

The appointment will in the first place be for the duration of the war.

Applicants must send twelve copies of their application and testimonials to the undersigned as soon as possible. Canvassing disqualifies. ARTHUR R. CASH, General Superintendent.

Head Office, Greenbank-road, 22nd June, 1943.

City of Birmingham.

PUBLIC HEALTH DEPARTMENT.

Applications are invited from registered medical practitioners for the temporary appointment of DEPUTY DIRECTOR (Executive Medical Officer) of the MASS RADIOGRAPHY DEPARTMENT under the Chief Clinical Tuberculosis Officer of the City.

Applicants should have extensive experience in the diagnosis of diseases of the chest and of chest radiology, and must be able to interpret the miniature and full-size films. The successful candidate may be required to undertake clinical work in the Anti-Tuberculosis Centre. The commencing salary will be according to experience on a scale of £750 per annum rising by £50 annually to £950 per annum, and bonus. The consent of the Ministry of Health has been given to this appointment, which will be subject to three months' notice of termination on either side.

Applications, stating qualifications, age and experience, and giving full information as to liability for military service, medical fitness and deferment, with copies of three recent testimonials, should be addressed to the Medical Officer of Health, Public Health Department, Birmingham, 3, and reach him not later than 17th July, 1943.

Canvassing is prohibited.

F. H. C. WILTSHIRE, Town Clerk.

Council House, Birmingham, June, 1943.

North Staffordshire Royal Infirmary,

STOKE-ON-TRENT.

Applications are invited from registered medical practitioners for the appointment of RESIDENT ORTHOPÆDIC OFFICER (B1), vacant shortly. Applicants should have had previous experience. The Fellowship diploma of one of the Royal Colleges of Surgeons is desirable. The Orthopædic Department serves a large industrial district and the post offers exceptional experience in traumatic surgery. The appointment will be for a period of one year in the first instance. Salary is at the rate of £300–£350 per annum, with full residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating age, nationality, qualifications, with three copy testimonials, to be forwarded as soon as possible to the HOUSE GOVERNOR.

The Radcliffe Infirmary, Oxford.

Applications are invited from registered medical practitioners, Male and Female, for the appointments of:—

(1) RESIDENT MEDICAL OFFICER (A) to the CHILDREN'S BRANCH at Rycote Park, Milton Common, near Oxford.

(2) HOUSE SURGEON (A).

Both vacant 1st August, 1943. The appointments will be for a period of six months. The salary is at the rate of £100 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

Applications, stating qualifications with dates, age, and nationality, with copies of three testimonials, must be sent not later than Monday, 12th July, 1943, to—

A. G. E. SANCTUARY, Administrator.

City of Leicester.

ISOLATION HOSPITAL AND SANATORIUM. (412 Beds.)

Applications are invited from registered medical practitioners for the appointment of RESIDENT MEDICAL OFFICER (B1), vacant 26th July. Salary is at the rate of £350 to £450 p.a. by £25 p.a., with the usual residential emoluments. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, on forms to be supplied, accompanied by copies of three recent testimonials, to be sent immediately to—

E. K. MACDONALD, Medical Officer of Health.

Health Department, Grey Friars, Leicester, June, 1943.

Liverpool and District Hospital for

DISEASES OF THE HEART, 34, Oxford-street, LIVERPOOL, 7.

Applications are invited from registered medical practitioners (Male or Female) for the appointment of HOUSE PHYSICIAN (A), to commence 1st October. Salary is at the rate of £100 per annum, with full residential emoluments. Facilities for M.D. thesis. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to: Miss J. LEWIS, Secretary.

Doncaster Royal Infirmary.

Applications are invited from medical practitioners (Male) for the appointment of HOUSE SURGEON (A). The appointment will be for six months. Salary £175 per annum, with full residential emoluments. This large industrial area offers excellent opportunities for gaining experience. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

Applications, accompanied by not more than three testimonials, to be sent immediately to—

R. LANCASTER, Secretary-Superintendent.

County Council of Durham.

DRYBURN EMERGENCY HOSPITAL, DURHAM.

APPOINTMENT OF TEMPORARY MEDICAL OFFICER (RESIDENT) (A).

Applications are invited from registered medical practitioners, Male and Female, for the above-named appointment, which is at present vacant. Salary is at the rate of £120 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of six months; otherwise will be for a period of not exceeding one year.

The appointment is subject to the regulations for the time being of the County Council relative to the payment of salary in the case of sickness, and the successful applicant will be required to pass the County Council's medical examination.

The appointment is terminable by one calendar month's notice on either side.

Applications, stating age, experience, liability for military service, medical fitness, position as regards deferment, &c., together with copies of not more than three recent testimonials, should be addressed to the County Medical Officer of Health, Shire Hall, Durham, and received by him not later than 30th June, 1943. J. K. HOPE, Clerk of the County Council.

Shire Hall, Durham, June, 1943.

County of Warwick.

STRATFORD-ON-AVON EMERGENCY HOSPITAL.

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1). Applicants should have held house appointments and had surgical experience. Salary is at the rate of £300 per annum, with full residential emoluments. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications on forms to be obtained from the Public Assistance Officer, Shire Hall, Warwick, should, on completion, be returned to him, together with copies of three recent testimonials, not later than the 14th July, 1943.

L. EDGAR STEPHENS, Clerk of the Council.

Shire Hall, Warwick, 22nd June, 1943.

County of Warwick.

NUNEATON EMERGENCY HOSPITAL.

Applications are invited from registered medical practitioners (Male and Female) for the appointment of RESIDENT MEDICAL OFFICER (B2), now vacant. Salary £250 per annum, together with the usual residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months; otherwise will not exceed one year.

Application should be made on forms which may be obtained from the Public Assistance Officer, Shire Hall, Warwick, and should be returned to him on completion not later than Wednesday, the 14th July, 1943.

L. EDGAR STEPHENS, Clerk of the Council.

Shire Hall, Warwick, 23rd June, 1943.

County of Warwick.

WARWICK HOSPITAL.

Applications are invited from registered medical practitioners for the appointment of TEMPORARY MEDICAL SUPERINTENDENT at the above Hospital, which is included in the Emergency Hospital Scheme. The person appointed will be required to devote his whole time to the duties of the office and practitioners rejected by the R.A.M.C. or otherwise not liable for recruitment to His Majesty's Forces may apply. The appointment is temporary in character during the absence of the permanent officer with H.M. Forces.

The salary will be at the rate of £800 per annum, in addition to which the person appointed will be granted an allowance of £100 per annum in lieu of residential emoluments.

Applications on forms to be obtained from the Public Assistance Officer, Shire Hall, Warwick, should, on completion, be returned to him not later than Friday, 16th July, 1943.

L. EDGAR STEPHENS, Clerk of the Council.

Shire Hall, Warwick, 22nd June, 1943.

Victoria Hospital, Burnley. (169 Beds.)

Applications are invited from registered medical practitioners (Male or Female) for the appointment of HOUSE SURGEON (A), vacant now. Salary at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of six months; otherwise it may be extended.

Applications should be sent immediately to—

J. E. WHEATCROFT, Secretary.

The University of Sheffield.

DEPARTMENT OF ANATOMY.

The Council of the University invites applications for a post of DEMONSTRATOR IN ANATOMY (Male or Female) at a salary of £300 per annum, duties to commence on 1st October, 1943.

Applications, accompanied by two recent testimonials, should reach the REGISTRAR of the University (from whom full particulars of the post may be obtained) not later than 2nd August.

Salisbury General Infirmary.

(Voluntary Hospital—225 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), now vacant. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications, stating age, nationality, and full particulars, together with copies of recent testimonials, to be sent at once to: JOHN WILLIAMS, Superintendent and Secretary.

County Borough of Huddersfield.

ST. LUKE'S HOSPITAL.

Applications are invited for the position of JUNIOR RESIDENT MEDICAL OFFICER (A) at the above Hospital. Salary £230 per annum, plus war bonus at present £16 18s., in addition to the usual residential emoluments. The position is a superannuated one. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for six months; otherwise not exceeding one year.

Applications should be forwarded, with a copy of two testimonials, to the MEDICAL OFFICER OF HEALTH, Huddersfield.

Walsall General Hospital.

(181 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the post of CASUALTY OFFICER (A), vacant shortly. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be forwarded immediately to—

R. C. MILLWARD, House Governor.

Rochdale Infirmary.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT SURGICAL OFFICER (B1), shortly vacant. Salary is at the rate of £250 per annum. Applicants should have held house appointments and had surgical experience. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply. Candidates must be members of a medical defence society.

Applications to be sent to: W. WYNNE, Secretary.

Stockport Infirmary. (159 Beds.)

Applications are invited from registered medical practitioners for the appointment of HOUSE PHYSICIAN (A), vacant early July. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications, stating age, nationality, and qualifications, with copies of three testimonials, should be sent not later than 3rd July to: H. G. PRICE, Secretary-Superintendent.

Royal West Sussex Hospital, Chichester.

(334 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT MEDICAL OFFICER (B2), vacant 1st August, 1943. The appointment is for six months. Salary £250 per annum, with full residential emoluments. R and W practitioners who now hold A posts may apply.

Applications must be received before the 19th July. Apply, with copies of three testimonials, to—

19th June, 1943. K. H. WILLIAMS, Secretary.

Huddersfield Royal Infirmary.

(321 Beds.)

Applications are invited for the combined appointment of HOUSE PHYSICIAN AND HOUSE SURGEON (B2) to the EAR, NOSE, THROAT, AND EYE DEPARTMENT. Duties to commence 23rd July. Salary at the rate of £187 10s., with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months.

Applications should be sent as soon as possible to—

H. J. JOHNSON, General Superintendent and Secretary.

Huddersfield Royal Infirmary.

(321 Beds.)

Applications are invited for the combined appointment of RESIDENT ANÆSTHETIST AND ASSISTANT CASUALTY OFFICER (A), duties to commence immediately. Salary at the rate of £150, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of six months.

Applications should be sent as soon as possible to—

H. J. JOHNSON, General Superintendent and Secretary.

County Borough of Newport.

SOCIAL WELFARE COMMITTEE.

JUNIOR RESIDENT MEDICAL OFFICER (A Post), TEMPORARY APPOINTMENT.

Applications are invited from registered medical practitioners, Male and Female, for the above appointment at WOOLOSTON HOUSE EMERGENCY HOSPITAL, Newport, Mon. Salary £150 per annum, with full residential emoluments, plus cost-of-living bonus. All fees, with the exception of coroners' fees, are payable to the Social Welfare Committee. Practitioners within three months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of six months; otherwise for a period of twelve months.

Applications, accompanied by copies of two recent testimonials, should be sent at once to—

TOM KAY, Director of Social Welfare.

Town Hall, Newport, Mon, June, 1943.

Corporation of Glasgow.

KNIGHTSWOOD FEVER AND EMERGENCY HOSPITAL. (336 (including 100 E.M.S.) Beds.)

Applications are invited from registered medical practitioners for appointment as SENIOR RESIDENT MEDICAL OFFICER (B1). Salary £350 per annum, with emoluments rated at £150 (plus present war increase). Applicants should have held medical or surgical house appointments. Preference will be given to candidates with some experience of infectious diseases.

Qualified R practitioners holding B2 appointments are invited to apply after obtaining the sanction of the Scottish Central Medical War Committee.

Applications, stating age, nationality, qualifications with dates, experience and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent to: THOMAS ANDERSON, Physician-Superintendent.

Nottingham General Hospital.

(585 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a RESIDENT CASUALTY OFFICER (A), now vacant. Salary is at the rate of £200 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of six months.

Applications to—

HENRY M. STANLEY, House Governor and Secretary.

Leeds Public Dispensary and Hospital.

Applications are invited from registered medical practitioners for the following resident posts:—

Two HOUSE PHYSICIANS (A). Appointment for six months. Salary at the rate of £150 per annum, with residence, board, and laundry. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

Applications, stating age, nationality, and qualifications, and accompanied by copies of three recent testimonials, to be sent as soon as possible to CHARLES F. J. MAURY, Secretary and Superintendent.

Chester Royal Infirmary.

(Normal capacity 225 Beds.)

Applications are invited from registered medical practitioners (Male and Female) for the appointment of ORTHOPÆDIC HOUSE SURGEON (A). The appointment will be for a period of six months. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to: W. H. GRACE, M.D., F.R.C.P., Hon. Secretary, Medical Committee.

Wrexham and East Denbighshire

WAR MEMORIAL HOSPITAL, WREXHAM.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), vacant 31st July, 1943. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply. Appointment will be for a period of six months.

Applications, stating age, nationality, qualifications, and accompanied by copies of testimonials, to—

LESLIE SPENCER, Secretary.

The Bolton Royal Infirmary.

(245 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A). Salary £175 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of six months.

Applications, stating age, nationality, and experience, together with copies of testimonials, to be forwarded to—

JOSEPH GRIFFITH, Superintendent-Secretary.

Rochdale Infirmary, Lancs. (110 Beds.)

The Board of Management invite applications from registered medical practitioners (Male or Female) for the appointment of HOUSE PHYSICIAN (A), vacant shortly. Salary is at the rate of £150 per annum, with full residential emoluments. Duties include work in ophthalmic, aural, and special departments, as well as medical clinic, and afford excellent opportunity for experience. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of six months.

The successful candidate must be a member of a Medical Defence Society.

W. WYNNE, Secretary.

Lincoln County Hospital.

(Voluntary Hospital—200 Beds.)

Applications are invited from registered medical practitioners for the appointment of a HOUSE SURGEON (A), vacant 6th July, 1943. Salary is at the rate of £175 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for six months.

Applications to: ARTHUR MOORE, Secretary-Superintendent. 11th June, 1943.

Royal Albert Edward Infirmary and

DISPENSARY, WIGAN. (Normally 189 Beds.)

Applications are invited from registered medical practitioners (Male) for the appointment of HOUSE SURGEON (A), now vacant. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of six months; otherwise may be extended for a further period.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent as soon as possible to—

A. STANLEY BRUNT, General Superintendent and Secretary.

West Sussex County Council.

ST. RICHARD'S (PUBLIC HEALTH) HOSPITAL, CHICHESTER. (678 Beds.)

Applications are invited from registered medical practitioners (Male and Female) for the appointment of ASSISTANT RESIDENT MEDICAL OFFICER (A), vacant now; duties chiefly medical. Salary is at the rate of £120 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for six months; otherwise not exceeding one year.

Applications, stating age, qualifications with dates, nationality, with details of any experience since qualification, and accompanied by copies of any recent testimonials, should be sent to the COUNTY MEDICAL OFFICER, County Hall, Chichester.

T. C. HAYWARD, Clerk of the County Council.

County Hall, Chichester.

The Prince of Wales's Hospital,

GREENBANK ROAD, PLYMOUTH.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a HOUSE SURGEON (A), vacant 19th August, 1943. Salary is at the rate of £175 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of six months.

ARTHUR R. CASH, General Superintendent.

21st June, 1943.

The Liverpool Sanatorium, Frodsham,

CHESHIRE. (175 Beds.)

Applications are invited from registered medical practitioners for the appointment of DEPUTY MEDICAL SUPERINTENDENT (B1). R practitioners holding B2 posts and rejected by the R.A.M.C. may also apply. The appointment is tenable for four years. Salary £400 per annum, with annual increments of £25. Married or single quarters available.

Applications, stating age, qualifications, and experience, with copies of recent testimonials, should be sent to the SECRETARY, Hospital for Consumption, Mount Pleasant, Liverpool, 3, not later than 21st July, 1943.

Staffordshire, Wolverhampton, and

DUDLEY JOINT BOARD FOR TUBERCULOSIS.

PRESTWOOD SANATORIUM. (200 Beds.)

Applications are invited from registered medical practitioners, including R practitioners who hold A posts, for the post of JUNIOR ASSISTANT MEDICAL OFFICER (B2) (Male) at the above-named Sanatorium, which is approximately nine miles from Wolverhampton. The successful candidate will have opportunities of obtaining experience in the work of a dispensary. The appointment will be for six months in the first instance, renewable for a further maximum period of six months, unless held by an R practitioner. Salary at the rate of £300 per annum, with board, residence, and laundry.

Forms of application may be obtained from the undersigned, and should be returned by first post on the 17th July, 1943, together with copies of not more than three recent testimonials.

T. H. EVANS, Clerk of the Joint Board.

County Buildings, Stafford, 26th June, 1943.

Coventry and Warwickshire Hospital.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE PHYSICIAN (A), vacant 1st July. The appointment is for six months. Salary at the rate of £150 per annum, plus £20 per annum cost-of-living bonus, with full residential emoluments. Practitioners within three months of qualification who are liable to service under the National Service Acts may apply.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be addressed immediately to—

S. CECIL HILL, House Governor and Secretary.

Coventry and Warwickshire Hospital.

Applications are invited for the post of Full-time, NON-RESIDENT CASUALTY OFFICER (B1). Salary at the rate of £600 per annum. Applicants must have had previous Hospital experience and be capable of undertaking the general duties of Casualty Officer without supervision. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating full particulars as to age, nationality, qualifications, and experience, and when available, should be addressed to the undersigned.

S. CECIL HILL, House Governor and Secretary.

Kettering and District General Hospital.

Applications are invited from registered medical practitioners, Male and Female, for the appointments of HOUSE SURGEON (A) and HOUSE PHYSICIAN (A). Salary is at the rate of £200 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

G. W. JACKSON, Secretary-Superintendent.

Northampton General Hospital.

(408 Beds.)

Applications are invited immediately from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A). Salary at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of six months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent as soon as possible to—

GORDON S. STURTRIDGE.

Liverpool Cancer Control Organisation.

Applications are invited for the combined post of Full-time (Acting) RADIOTHERAPIST to this Organisation and (Acting) MEDICAL DIRECTOR of the RADIOTHERAPEUTIC DEPARTMENT of the Liverpool Radium Institute. The person appointed will be in charge of Radiotherapy (Radium and X-rays) at the Liverpool Radium Institute, and will be expected to collaborate with the physicians, surgeons, radiologists, and radiotherapists to the other hospitals included in the Organisation. Salary £1250 per annum, with five annual increments of £50 each. Superannuation to be arranged under the Federated Superannuation Scheme for Nurses and Hospital Officers.

Applications, together with the names of three persons to whom reference may be made, should reach the undersigned (from whom further information can be obtained) not later than 24th July, 1943.

A. V. J. HINDS, Honorary Secretary.
Liverpool Cancer Control Organisation,
66, Rodney-street, Liverpool, 1.

The Children's Hospital, Sheffield (Inc.).

(157 Beds.)

Applications are invited from registered medical practitioners, Male and Female, including practitioners within three months of qualification and liable under the National Service Acts, when the appointment will be for a period of six months, for the appointment of HOUSE PHYSICIAN (A), vacant 16th July, 1943. Salary is at the rate of £100 per annum with full residential emoluments.

Applications, stating age, nationality, qualifications, and accompanied by copies of three recent testimonials, should be sent to the undersigned. The successful applicant must be a member of a Medical Defence Society.

T. H. G. GARTLAND, Superintendent and Secretary.

County Borough of Ipswich.

BOROUGH GENERAL HOSPITAL.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a TEMPORARY RESIDENT ASSISTANT MEDICAL OFFICER (B1). Applicants should have held house appointments and had surgical experience. Salary is at the rate of £350 per annum, plus full residential emoluments. Suitably qualified R and W practitioners holding B2 posts, also R practitioners holding B1 posts and rejected by the R.A.M.C., may apply.

Applications to the MEDICAL OFFICER OF HEALTH, Public Health Department, Elm-street, Ipswich.

Northumberland County Council.

HEXHAM EMERGENCY HOSPITAL.
(Regional Orthopædic Centre—640 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the following appointments:—

SENIOR HOUSE SURGEON (B2). Salary £200 per annum, with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months; otherwise it will be for a period of one year.

HOUSE PHYSICIAN (A) and HOUSE SURGEON (A). Salaries at the rate of £120 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months; otherwise not exceeding one year.

The Hospital offers excellent training and experience in orthopædic surgery.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of recent testimonials, should be sent by 12th July to—

J. B. TILLEY, County Medical Officer.
County Hall, Newcastle upon Tyne, 1.

Rotherham Hospital.

General Voluntary Hospital. (140 Beds.)

Applications are invited from registered medical practitioners for the appointment of SECOND CASUALTY OFFICER AND HOUSE SURGEON (A) to EAR, NOSE, AND THROAT and EYE DEPARTMENTS, vacant 9th July, 1943. Salary £200 per annum (with full residential emoluments). Practitioners within three months of qualification and liable under the National Service Acts may also apply, when the appointment will be for six months.

Applications, stating age, qualifications with dates, and nationality, accompanied by copies of recent testimonials, should be sent to the SECRETARY-SUPERINTENDENT.

Ancoats Hospital, Manchester, 4.

HOUSE SURGEONS (A). Four required to commence duty on or before 26th July next. The appointments will be for a period of six months. Salary at the rate of £120 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

Applications, stating age and qualifications, together with copies of three recent testimonials, to be forwarded on or before 14th July.

HERBERT J. DAFFORNE,
General Superintendent and Secretary.

The Robert Jones and Agnes Hunt

ORTHOPÆDIC HOSPITAL, OSWESTRY.

Applications are invited from registered medical practitioners, Male or Female, including R practitioners who now hold A posts, for the appointment of RESIDENT HOUSE SURGEON (B2), now vacant. The appointment will be limited to six months. The salary is at the rate of £200 per annum, with full residential emoluments.

Applications, stating age, nationality, qualifications, &c., with copies of recent testimonials, to be forwarded at once to the SECRETARY-SUPERINTENDENT.

Walsall General Hospital.

(181 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the following posts:—

HOUSE SURGEON (A)
HOUSE PHYSICIAN (A)

vacant shortly. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be forwarded immediately to the undersigned.

R. C. MILLWARD, House Governor.

Hove General Hospital.

Applications are invited from registered medical practitioners (Male or Female) for the appointment of RESIDENT MEDICAL OFFICER (B2). Salary at the rate of £200–£250 per annum, according to experience, with full residential emoluments. R and W practitioners who now hold A posts may apply, when appointment will be limited to six months; otherwise may be extended.

Applications should reach the undersigned as soon as possible.

J. V. ROE, Secretary-Superintendent.

Scarborough Hospital, Yorkshire.

Applications are invited from Female registered medical practitioners for the post of HOUSE PHYSICIAN (A). The appointment is for six months commencing 1st August, 1943, and the salary is at the rate of £175 per annum, with board, residence, laundry, &c. Practitioners within three months of qualification and liable under the National Service Acts may also apply.

Applications, with age, testimonials, qualifications, &c., to be sent immediately to the SECRETARY.

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University of Oxford.

NUFFIELD COMMITTEE FOR ADVANCEMENT OF MEDICINE.

The Committee invites application from registered medical practitioners for the post of GRADUATE ASSISTANT (non-resident) to the NUFFIELD DEPARTMENT OF OBSTETRICS AND GYNÆCOLOGY. Duties will include clinical work, teaching, and research. Applicants should hold the qualification of M.R.C.O.G., or be in a position to submit themselves for that examination. Registered practitioners not eligible for military service may apply. The appointment is for one year in the first instance with possibility of renewal. Initial salary is at the rate of £400 p.a.

Applications must reach Professor J. C. MOIR, Radcliffe Infirmary, Oxford, before 19th July, 1943, and must contain a full statement of qualifications, and the names of not more than three referees. Testimonials are not required. Inquiries regarding the post should be addressed to Professor J. C. Moir.

Oldham Royal Infirmary. (186 Beds.)

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1), vacant 22nd July. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding Diploma of F.R.C.S. The minimum salary will be £400 per annum with board, residence and laundry. The Committee will be prepared to consider the payment of a higher salary to applicants with considerable surgical experience. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, together with copies of three recent testimonials, to be addressed to : F. W. BARNETT, General Superintendent and Secretary.

Macclesfield General Infirmary.

(100 Beds—2 Residents.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), vacant 31st July, 1943. Salary is at the rate of £175 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply. Appointment will be for a period of six months.

Applications, stating age, nationality, qualifications, and accompanied by copies of testimonials, to the SUPERINTENDENT, General Infirmary, Macclesfield.

Royal Sheffield Infirmary and Hospital.

THE ROYAL INFIRMARY, SHEFFIELD.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT SURGICAL OFFICER (B1), tenable in the first instance for six months from 1st July, 1943. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. Salary is at the rate of £200 per annum. Suitably qualified R and W practitioners holding B2 appointments, also R practitioners holding B1 appointments and rejected by the R.A.M.C., may apply.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent forthwith to— H. KINGSLEY PEARCE,

General Superintendent and Secretary.

Royal Infirmary, Sheffield, 6.

Birmingham Accident Hospital and REHABILITATION CENTRE.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a HOUSE SURGEON (A), vacant immediately. Appointment will be for six months. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may apply.

A. A. MACIVER, Secretary.

Bath-row, Birmingham, 15, 24th June, 1943.

Clayton Hospital, Wakefield, Yorkshire.

Applications are invited for the appointment of a CONSULTING PHYSICIAN to reside in the Wakefield district. Commencing salary £300 per annum, with facilities for private consultant practice.

Applications, &c., to be addressed to CHAIRMAN OF BOARD OF GOVERNORS, Clayton Hospital, Wakefield, from whom further particulars may be obtained on request.

Westmorland County Hospital, Kendal

(82 Beds.)

Applications are invited from registered medical practitioners (Female) for the appointment of HOUSE SURGEON (B2), now vacant. Salary £300 per annum, with board, residence, and laundry. W practitioners who now hold A posts may apply, when appointment will be limited to six months; otherwise may be extended.

Applications, stating age, qualifications with dates, nationality, present post, and accompanied by copies of three recent testimonials, should be sent without delay to—

J. M. SOMERVELL, Honorary Secretary.

Bootle General Hospital, Linacre Lane,

BOOTLE, LIVERPOOL, 20.

ONE HOUSE PHYSICIAN (A)
ONE HOUSE SURGEON (A)
ONE ORTHOPÆDIC HOUSE SURGEON (A)

Applications are invited from registered medical practitioners, Male and Female, for the above appointments. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months; otherwise for 6 months with possibility of an extension.

Applications, with copies of recent testimonials, should be sent as soon as possible to : A. J. COOPER, Superintendent.

The Royal Hospital, Wolverhampton.

(Incorporated under Royal Charter)
(310 Beds.)

Applications are invited from registered medical practitioners for the following appointments :

CASUALTY OFFICER (B2), vacant now. Salary is at the rate of £150 per annum, with full residential emoluments. R practitioners who now hold A posts may apply, when appointment will be limited to six months.

HOUSE SURGEON (A), vacant now. Salary is at the rate of £100 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts may also apply, when appointment will be for a period of six months.

Applications to : W. COCKBURN, House Governor.

28th June, 1943.

Barbados General Hospital.

(284 Beds.)

Applications are invited from duly qualified medical practitioners as HOUSE SURGEON. Preference will be given to candidates who have had experience in administering anæsthetics.

Salary of £325 per annum has been increased to £450 per annum until 31st March, 1946. Quarters fully furnished for a single man, with free water, lighting allowance, and no local rates.

The appointment, which is renewable, will be for either 3, 2, or 1½ years, subject to three months' notice on either side to terminate the engagement. Candidates must state whether they wish to engage for 3, 2, or 1½ years. First-class single passage direct to Barbados will be paid by the Hospital Board, a proportionate part to be refunded if the term of service for which the candidate is engaged be not completed.

Canadian graduates must hold qualifications registrable in England. Candidates holding a United States degree must be registered in the State of New York.

Applications, stating age and date of graduation, accompanied by a recent photograph, a medical certificate of physical fitness at the time of application, and recent professional and personal testimonials, should be sent by airmail to the Medical Superintendent, General Hospital, Barbados, B.W.I., from whom further particulars may be obtained. By Order,

W. GOODMAN, Secretary.

Doctors, Male and Female, required for duration locums, locums, and Assistantships, in Yorkshire and Lancashire, &c. Good salaries paid. Vacancies for Ships' Surgeons.—Write, A. SHAW, Medical Agent, Premier Buildings, 88, Church-street, Liverpool, 1.

Medical Officer requires Secretary-RECEPTIONIST, shorthand-typing essential, experience an advantage.—Write Box 4866, GOOD ADVERTISING LTD., 82, South Audley-street, W.1.

Medical Practices and Partnerships for disposal; also Dental Practices. All classes of Insurance transacted.—Write, A. SHAW, Medical Agent, Premier Buildings, 88, Church-street, Liverpool, 1.

Hove.—Labour-saving Detached Free-hold Residence on two floors, 4 recep., 4 main and 2 small bedrooms, all with h. & c., 2 bathrooms, parquet floors, gas- and/or power-points all rooms, central heating, side-entrance for surgery, small garden back and front, 300 yards sea front, ready for occupation. Price £3500, or would let £160.—Address, No. 293, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Encyclopedia Britannica 11th to 14th editions wanted (£20 to £25 offered 14th edition); also Children's Encyclopedia, edited Mee (£5 offered modern sets), similar sets and libraries of modern books. Advertiser pays carriage and provides packing cases.—E. TURLL, 15, Bethia-road, Bournemouth.

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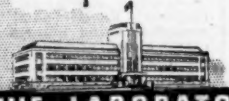

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